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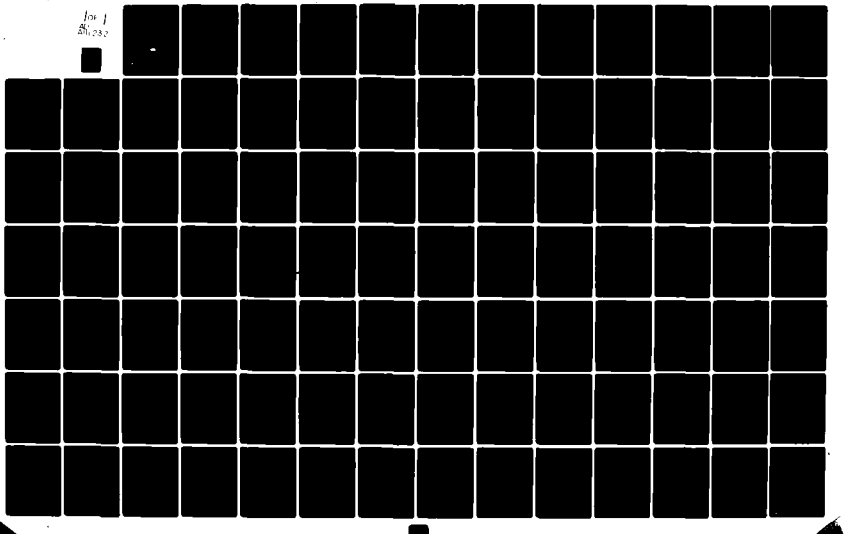

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GREAT LAKES/ST. LAWRENCE SEAWAY

FLEET MIX

TASK 5 Report of Great Lakes/St. Lawrence Seaway Regional Transportation Studies

Prime Contract DACW 35-80-C0060

March 1981

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Submitted to

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North Central Division, Corps of Engineers
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The report contains interviews of fleet operators, shipbuilding firms, port authorities, shipping associations and lock operating authorities which were used to make determinations of existing fleet structure, annual shipbuilding output, annual ship requirements and predictions of future fleet mix. A base year fleet mix was identified as was a method for preparation of a fleet forecast model based on commodity demand.

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1. SUMMARY

A fleet mix for future years depends on the existing fleet structure and the projected requirements for shipping commodities. Many other events also affect fleet mix, but the most important considerations are economic--fleet building and retirements follow demand and the economic considerations of operating vessels.

To develop an appreciation for the plans and perceptions of the organizations that will build, purchase, and operate future fleets, the task began with interviews of fleet operators, shipbuilding firms, port authorities, shipping associations, and lock operating authorities. The information developed in these interviews provides a background for making decisions concerning predictions of future fleet mix.

In addition to the interviews, records were examined showing the current fleet inventory, the annual shipbuilding output, annual ship retirements, and forecasts of shipbuilding requirements. These records were used to plot recent trends in shipbuilding.

Finally, a baseline fleet was developed using these records and records of vessel transits categorized by vessel class for a baseline year.

This section summarizes the information that was obtained in this investigation.

1.1 Great Lakes Fleet Operator Interviews

Great Lakes fleet operators have no long range shipbuilding plans past 1983. When ships are built, they are generally the largest ships that can meet the demands of a particular trade situation. The largest ship possible is not always built, however, because of port limitations.

The smallest ships are not always retired first because some of these ships are needed to serve a particular trade; however, statistics on retirements show that larger ships are likely to remain in service for a longer period of time.

Ships are built for a relatively near term demand for commodities. A major shift in the demand for the basic commodities that move through the lakes can also be expected to result in a shift in shipbuilding trends. For example, a

sudden demand for coal or grain shipments would probably result in more large ships being built to carry these commodities.

Great Lakes shipyards are generally operating under capacity. Shipyards presently have excess capacity for all categories of ships.

All fleet operators agree that extended season navigation will increase the costs of maintenance, but most do not expect that it will reduce ship life. Many fleet operators are interested in extended season navigation, but none of those contacted are interested in year-round navigation. Of the operators interested in the extended season navigation, most favor a 10 month season.

Limited draft in harbors and channels is cited as a major problem with the present GL/SLS System. Ships also experience delay problems at the Soo Locks and at the Welland Canal.

To improve the system, fleet operators would like to have another Poe sized lock at the Soo, and a larger system at the Welland Canal.

1.2 Ocean/Lake Fleet Operator Interviews

Only one fleet operator is dedicated to the combined lakes/ocean trade. The other international traffic coming into the system consists of tramps. The single dedicated System operator has a fleet of relatively new vessels designed for use in the Seaway. These ships are designed to Seaway dimensions and carry up to 26,000 deadweight tons (DWT) per load at Seaway drafts. The tramps, on the other hand, are generally small vessels and carry only about 8,000 to 14,000 tons at Seaway draft. Since the tramps have a small load and lock more slowly than the lakers, the tramp traffic generally results in an under utilization of the GL/SLS System.

1.3 Great Lakes Shipyard Interviews

There are four major shipbuilding yards in the Great Lakes area, two U.S. and two Canadian. Shipyards are not currently operating near capacity. Although there may sometimes be delays in obtaining ordered ships, in general, shipyard capacity can be expected to expand to meet the demand. Shipbuilders do not believe that winter operations will have a significant effect on a ship's life, but they all admit that operations in ice increases maintenance costs.

1.4 Great Lakes Port Authority Interviews

These interviews showed that Great Lakes ports are currently under-utilized. Traffic estimates indicate that ports are operating at about 25 to 60% of desired capacity. Port authorities are all interested in extended season navigation. Ports with no ice favor year-round navigation, however, ports with ice problems favor a season extension to 10 or 11 months.

1.5 Great Lakes Shipping Association Interviews

The discussions with the shipping associations tend to confirm the information obtained from fleet operators. For example, shipping associations confirm the view that larger ships are more economical to operate, and therefore will be used whenever possible. The Lake Carriers Association confirms the requirement for a second Poe sized lock at the Soo. Canadian shipping associations also confirm the requirement for increased capacity at the Welland Canal, and suggest that the capacity of the system could be increased without a physical change by changing the toll structure to favor larger vessels.

1.6 Current Fleet Mix

The current U.S. fleet is primarily composed of Class 5 ships (length of 600 to 649 feet) with a carrying capacity of about 15,000 DWT. The U.S. fleet also has ten 1,000 footers plus 13 ships in the Class 8 category. The present Canadian fleet is predominantly Class 7 vessels with a length of 700 to 730 feet and a carrying capacity of about 26,000 DWT. Table 1 shows the ship classification system used in this study.

1.7 Fleet Building Trends

In the past 10 years, most U.S. shipbuilding has been in Class 5 vessels to serve customers in small ports, and in Class 10 vessels to increase the efficiency of operations to large ports. Canadian shipbuilding continues to concentrate on the Seaway Class 7 vessels, with a lower level of construction in the smaller vessels of Class 4 and below.

1.8 Predicting Future Fleet Mix

Predictions of future fleet mix are based upon projected commodity demand. The fleet mix projections begin by establishing a baseline fleet for a given waterway and locks system. Next, the baseline fleet is updated to meet the commodity demand projected for future years. The way in which the fleet is updated depends on predictions of commodity demand and changes to the GL/SLS

TABLE 1 SHIP CLASSIFICATION SYSTEM

VESSEL CLASS	VESSEL LENGTH RANGE (FT) MIN.	MAX.	MEAN VESSEL SPEED (MPH)	MAXIMUM CARRYING CAPACITY (S. TONS)	CAPACITY INCREASE WITH DRAFT (ST/IN)
3	(PLEASURE CRAFT, NON-COMMERCIAL VESSELS, AND ICE LOCKAGES)				
4	0	599	13.8	9,500	0.0 (1)
5 (2)	600	699	13.9	21,000	91.8
6 (3)	400	699	14.7	15,000	61.8
7	700	749	14.7	27,000	113.1
8	750	849	14.9	28,000	115.6
9	850	989	14.9	45,000	167.1
10	990	1,099	14.9	60,000	207.1

(1) Class 4 ships cannot exceed design draft

(2) Class 5 includes lakers of classes 5 and 6.

(3) Class 6 is for ocean vessels.

System. For example, if commodity demand follows current trends, and if no physical changes are made to the system, then additions to the baseline fleet will follow recent shipbuilding trends. If, however, an unusual change is predicted for a particular commodity, then the baseline fleet expands with a larger portion of ships built to meet that increased demand. Also, if a system expansion alternative includes physical changes to locks and channels, then the program for fleet expansion is changed to reflect shipbuilding trends that could be expected as a result of these physical changes. In all cases, ships are only added to the fleet to meet the commodity demand. The new fleets developed to meet this demand can then be used to determine the impact on the GL/SLS System capacity and operating conditions.

2. INTRODUCTION

The Great Lakes/St. Lawrence Seaway System (GL/SLS) provides a shipping link between the deep water of the Atlantic Ocean and ports 2400 miles inland on the American continent. This includes 1000 statute miles down the St. Lawrence River, 1350 miles over the Great Lakes, and 400 miles in connecting channels. In that distance there are sixteen sets of locks that lift ships from sea level to an elevation of 600 feet in Lake Superior.

The capacity of any navigation system, including the Great Lakes/St. Lawrence Seaway System, is determined by the System's limiting or constraining element; the element which has the slowest processing time. In very general terms, the GL/SLS System can be thought of as a series of locks, connecting channels, and harbors. The complexity in the three lock systems, the five connecting channels, and over forty harbors becomes even more significant when the numerous trade routes between the various harbors for inland traffic and for the ocean trade are also considered. Generally, for navigation systems equipped with locks, the traffic capacity, defined either in terms of annual tonnage or annual vessel transits, is constrained by the locks. Prior capacity studies of the GL/SLS System have indeed shown the locks to be the constraining element of this System. As the annual tonnage shipped on the GL/SLS navigation system continues to increase in the future, the demand for service at the locks will increase accordingly, and as the capacity limits of the system are approached, vessels will begin to experience long waiting times and long vessel queues at the locks. The resulting inability of the system to effectively service its customers would obviously be reflected in a decrease in the popularity and use of the system, with an adverse impact on the economic growth of the entire nineteen state region served by the system.

Any transportation system interested in serving its customers over the long term must plan to provide an expanded capacity when the need for such capacity is required by the system's users. For a simple system having one major constraining component, the removal of the constraint at that one point removes the system constraint. For a more complex system, such as the GL/SLS navigation system, the multiplicity of locks, connecting channels, and harbors presents a more challenging assignment to the planners addressing the removal of system capacity constraints over the long term. An analysis of the entire system is required to ensure that removal of a constraint

at one feature or location does not simply result in movement of the constraint to another feature or location with relatively little, if any, improvement in the overall system capacity.

With such considerations in mind, the North Central Division of the U.S. Army Corps of Engineers initiated a study entitled, "Great Lakes/St. Lawrence Seaway Regional Transportation Studies," having as its primary objective the development of a sound documented working tool for use in analyzing GL/SLS regional transportation improvement alternatives. This report documents the portion of the work of Task 5 of this program concerned with the development of a methodology for determining the GL/SLS fleet mix. The establishment of the fleet mix is critical in any investigation of locking system capacity since the make-up of the fleet effects both lockage times and the amount of tonnage transported per lockage. This is true in the case of investigations of near-term capacity conditions where relatively high confidence levels can be placed on the make-up of the near-term fleet. It is even more critical and difficult in analyzing long term situations, such as in the case of the present study where the time period of interest extends to the year 2050. In such a situation it is necessary to establish projections of the future fleet mix on the soundest possible basis in order to have the results of a capacity analysis be of value in long range planning.

A fleet mix for future years will depend on the existing fleet structure and the projected requirements for shipping commodities. Many other events will also affect fleet mix, but the most important considerations are economic - fleet building and retirements will follow demand and the economic considerations of operating vessels.

Addressing the problem of a greater level of detail, fleet mix is based on the plans, perceptions, and practices of the firms and agencies that operate in the system. In order to assess the impact of the decisions made by these firms and agencies, ARCTEC, Incorporated interviewed a great many Seaway users and operators. These include:

- Fleet Operators. Twelve lake fleet operators were interviewed covering 218 of the 302 ships that currently operate on the Great Lakes. These fleet operators described their plans for fleet expansion, their perception of market changes, problems they experience with the present Seaway System, and their recommendations for Seaway improvements. In addition to the contacts with the lakes fleet operators, six international shipping firms were contacted,

including operators and agents for tramp lines that use the Seaway on a single voyage or seasonal basis.

- Shipbuilding Firms. Five Great Lakes shipbuilders were contacted to determine yard capacity, expansion plans, future building commitments, the effects of winter navigation on ship life and maintenance, and estimates of future ship costs.

- Port Authorities. Port authorities for thirteen major Great Lakes ports were contacted to determine individual port ship size capability, to discuss loading facilities and problems with waiting to service ships, problems with winter navigation, and recommended limits to season extension.

- Shipping Associations. Organizations providing services to Great Lakes shippers were contacted to identify existing problems and to review their assessment of future requirements.

- Seaway Operating Authorities. Seaway locks systems operating authorities were visited to determine current traffic levels, future traffic predictions, and alternatives considered likely to increase system capacity.

Some of the information obtained in these interviews directly affects the decisions that will be made to establish the fleet mix for various operating scenarios. Some of the information provides valuable background to the decision making process. All of the information is essential to understanding how the Seaway operates now, and the expectations of the operators for the future. This task report, therefore, begins by describing the results of these interviews in some detail. The sources of this information will not be noted in the discussion, however, a summary of each interview is contained in Appendix A.

The projection of the future fleet mix will also be based on Great Lakes fleet records. These records include:

- Current fleet inventory
- Annual shipbuilding output
- Records of ship retirements
- Forecasts of shipbuilding requirements combined with fleet composition forecasts developed by recognized shipping authorities.

The fleet mix developed in this analysis is based on both historic and predicted vessel building patterns. The fleet size is adjusted to meet demand using known shipbuilding trends and predictions of future trends. The analysis recognizes that ship size is often limited by port size, and that less-than-maximum length vessels will be built to meet the requirements of smaller ports as long as the demand for these vessels exists.

The fleet mix for all the Seaway scenarios developed in this study is based on current shipbuilding practices and predicted trends. The formula for determining this mix is changed as necessary to account for the requirements of different system expansion alternatives. For example, a new shipbuilding pattern would be established if the physical capacity of the Welland Canal is expanded. But in all cases, the fleet is only changed to meet the requirements of commodity demand. Ships are added to the fleet to meet this demand. If the commodity projections are reasonable, then the fleet projections are also good. The credibility and reasonableness of projections are assured by a sound prediction of the commodity flow.

This section of the report describes the way the baseline fleet mix was established. This fleet mix reflects the composition of the current Great Lakes fleet carrying the current commodity flow. To develop a baseline as a reference to evaluate Seaway System alternatives, this fleet is first adjusted to meet future demand assuming there are no physical changes to the Seaway System. A separate fleet mix is then developed for each Seaway expansion alternative so that the impact of these alternatives can be evaluated. The fleets developed for these alternatives are shown as a part of the analysis of non-structural and structural alternatives to increase lock capacity.

3. GREAT LAKES FLEET OPERATOR INTERVIEWS

All fleet operators with nine or more ships were interviewed for this study to review their experience in Great Lakes fleet operations and their perception of future trends. Although there are wide differences in opinion among the operators, there are also areas of general agreement. The paragraphs that follow describe the areas in which there is a consensus among the operators, and in some cases the areas in which there is substantial disagreement. The purpose is to present, as clearly as possible, the opinion of the shipping community.

3.1 General Shipbuilding Plans

Great Lakes fleet operators have no long range shipbuilding plans past 1983. Some U.S. operators have single ships planned, and several Canadian operators plan to add 730 foot vessels to their fleet or to acquire used vessels. Some large operators, such as U.S. Steel, simply plan to build to meet the demand.

3.2 Ship Management Policy

Fleet operators were asked if the largest ships are always built first. Opinion is split about evenly between yes and no. A better answer is probably that the largest ship possible is built to meet a specific trade requirement. The largest ship suitable for a particular trade requirement may not have a length of 1000 feet, or 730 feet, because of port and channel limitations. The 1000 foot ships are generally only built to meet a specific contract. Ships built for several applications are likely to be built at less than maximum size so that they can be used in a variety of ports. Even U.S. Steel, the largest of the ore carriers, does not add all 1000 footers. They also build smaller ships, but they build 1000 foot ships for the ports that can handle them. Ships are also built at less than maximum size for special functions, that is, some self-unloaders are more efficient if they are smaller than maximum size.

Fleet operators were asked if the smallest or the oldest ships are always retired first. The interviews show that there is no general rule for retiring a ship. Ships are dropped because they are no longer economic. This is often the smallest ship, but not necessarily the oldest. Some small

ships are kept just to serve a single customer, one that cannot be served by a larger ship. Older ships are often scrapped because of both engine inefficiency and ship size. In general, smaller and older ships are scrapped first.

Checking historical records of the 64 ships retired from the Canadian and U.S. Great Lakes fleets in the last five years, the average retirement age was 50 years with a standard deviation of 21 years [1]. The standard deviation is rather large because these records include ships that were retired or scrapped for all reasons, not just old age. Some of these ships may have been lost because of groundings, collisions, or massive machinery failures. This results in the average age being lower than what might be expected, and the deviation being greater.

A cursory review of the records also indicates that the ships that are retired early are generally the smallest of the group. To check this out, the records of ships retired in less than 40 years and in more than 40 years were considered separately. This investigation shows that the ships that were retired with less than 40 years of service were small, with nearly all having a maximum length of less than 400 feet. Considering just these ships together, they were retired with an average age of 25 years and a standard deviation of only about 8 years, showing that nearly all were retired very close to the average age.

In contrast to the practice of retiring ships early, ships that were retired after more than 40 years were predominantly larger than 400 feet, and were retired at an average age of 66 years. These statistics are shown in Table 2 below.

TABLE 2 AVERAGE AGE AND LENGTH OF RETIRING SHIPS, 1975 to 1980

SHIPS RETIRED IN LESS THAN 40 YEARS (26 ships)

AV. LENGTH (ft)	1σ (ft)	AV. AGE (yrs)	1σ (yrs)
350.5	115.2	25.3	7.6

SHIPS RETIRED IN GREATER THAN 40 YEARS (38 ships)

526.9	116.2	66.3	7.2

These statistics show that the larger ships can generally be justified economically for a longer period of time. Since these ships are economic, they are probably modified to be

self-unloaders, and inefficient power plants are replaced to justify the extended life. Some small ships are kept active for many years to serve a particular port, but in general, smaller ships can be expected to be dropped first.

3.3 Shipbuilding Plans as a Function of Commodity Demand

Ships are built for a relatively near-term demand for commodities. Commodities that control Great Lakes shipping are:

- Grain
- Ore
- Limestone
- Coal.

Grain is the deciding commodity for bulkers. Grain also has the highest return of all the bulk cargos. The demand for grain is high now and is expected to increase. Some fleet operators and shipping analysts believe that as the grain business grows, grain will be carried eastbound in 1000 footers for transshipment at Port Colborne through the Welland Canal. This would establish a new transshipment point at the head of the Welland Canal and provide motivation for Canadian fleet operators to acquire 1000 foot ships.

Ore and limestone trade will probably grow in the long run, but growth will depend on the highly variable steel industry. In the future, more ore is expected to come down from Lake Superior and less to come west from Labrador.

Coal is the big unknown for Great Lakes shipping. Some increase in demand is expected based on increased consumption by utilities. Overseas shipments represent a possible large growth factor. Many Great Lakes ports are able to enter this trade now, and many fleet operators are anticipating the requirement to supply ships.

A recent Maritime Administration (MarAd) study, issued in December 1980, covers the prospects for an overseas coal market in detail [2]. This study concludes that if the overseas market develops, there will be increased U.S. ship construction in the 730 by 76 foot class since the U.S. presently has only four of these vessels. Further, the most competitive method of shipment would be a Great Lakes/St. Lawrence Seasway feeder service to Canadian St. Lawrence ports servicing vessels of 80 to 100,000 DWT.

The report also points out that western coal from Wyoming through Superior, Wisconsin, is competitively priced. Appalachian coal through Conneaut, Ohio is also competitively priced, and Appalachian coal is competitive through several other ports if a demurage charge of $10 for east coast ports is considered.

General cargo is not important in lakes traffic. Large container ships plus rails may take up what might have been considered new capacity for this cargo. If the Welland is not expanded, fleet operators believe that saltie traffic will drop.

3.4 Capacity of Shipyards to Meet Requirements

Shipyards are generally operating under capacity, although Canadian yards are probably closer to capacity than are U.S. yards. Current U.S. and Canadian annual capacity (combined) is roughly:

LENGTH OF SHIP (ft)	CAPACITY	BACKLOG
1000	2	2
730	6	9
600	1	1

Since the backlog extends through 1983, shipyards have additional caapcity in all categories of ships. Capacity is particularly high for the 730 foot ship. This is significant since 730 foot ships would be most in demand if either grain or overseas coal business expand significantly. A big increase in overall ship demand could possibly result in a wait for ships as it did in the early 1970's, but there is presently no lack of capacity for current demand.

3.5 Extended Season Navigation

All fleet operators agree that extended season navigation will increase costs for maintenance, but most do not expect that it will reduce ship life. If it does reduce ship life, it would be considered to be worth it based on higher fees to users.

Many fleet operators are interested in extended season navigation, but none of those contacted are interested in year-round navigation. About one-third of the operators contacted are not interested in a longer season at all. Also, about one-third of the fleet operators contacted are taking some steps to make their vessels more ice-worthy.

Of the operators interested in extended season navigation, most favor a 10 month season. Even major shippers, such as U.S. Steel, who have a big commitment to extended season navigation because of stockpiling problems, are only committed to a gradual increase in season to about 10 months. They would prefer to begin with a modest, but guaranteed season extension first, then identify their future requirements as time goes on. All operators express a need for increased Coast Guard icebreaking support to keep the channels open, not just help to rescue ships stuck in ice. A major Canadian shipper believes that extended season navigation is best in the western part of the system up to Kingston, Ontario. The section of the St. Lawrence Seaway system east of Kingston is colder, which makes winter operations more difficult. This colder section of the Seaway is considered to be less likely to benefit from extended season operations.

3.6 Problems With the Present Seaway

Limited draft in harbors and channels is cited as a major problem with the present system. Ships also have a problem waiting to be served at the Soo Locks. All large operators who use the Soo Locks believe there should be a second Poe-sized lock.

Many operators mention the problem of waiting at the Welland Canal. This problem is particularly severe at the end of the season when the salties come in for winter stockpiling. Salties are not efficient operating through the Welland Canal. Because of their construction they go through about 8,000 tons lighter than lakers. They also contribute to congestion because they are slow in going through the locks.

Some fleet operators believe that the capacity of the Welland is low because so many small ships go through. They believe tolls should be charged by the lockage rather than by tons capacity. This would discourage the smaller ships, with the result that the capacity of the canal would, in their opinion, increase by an estimated 45%.

3.7 Suggested Changes to the Seaway

Fleet operators believe the Welland Locks should be larger; this includes increased length, width, and depth. Length is not as important to some operators as width and depth.

Traffic handling should be better at the Welland, but there is no fleet operator interest in the use of shunters to

increase capacity. Some of the locks should be twinned, particularly Number 7. There is also a need for an improved fueling facility at the Welland. Better fueling would speed up traffic, particularly the salties.

U.S. shippers recommend a new large lock at the Soo. This view is held by all fleet operators contacted who use the Soo Locks System.

Another problem cited by the fleet operators relates to the use of the St. Marys River channel in the vicinity of Neebish Island during extended season navigation. The channel splits at Neebish Island. During the open water season, downbound traffic goes to the west of Neebish Island. After ice develops late in the season, the western, normally downbound, channel is not used at all because ice prevents ships from going through the narrow Neebish Island Cut. As a result, only the upbound or eastern, channel is used after ice forms. The problem is that the upbound channel is not dredged to 27 feet all the way across. The western lane is dredged to 27 and 28 feet but the eastern side of the channel is only maintained at 21 feet. Since fixed navigation aids are also removed late in the season, fleet operators believe that the entire channel should be dredged to 27 feet for safe winter operation.

3.8 Other Notes Concerning Fleet Operations

Currently grain is taken to Quebec City for transshipment and ore is returned from Labrador when loads are available. Since westbound shipments of ore have dropped, many ships are returning in ballast.

Many ships do not use the locks at all, particularly the smaller ships in the 550 to 680 foot, 10 to 22,000 ton range. These ships are often used in a single lake for local customers.

There is currently a strong demand for exporting grain; the limitation as seen by the fleet operators is the number of ships the Seaway can move.

4. OCEAN/LAKE FLEET OPERATOR INTERVIEWS

There is only a small segment of international shipping dedicated to operating in the Seaway system. Federal Commerce and Navigation Company of Montreal has fourteen ships built for this trade. These ships have an average length of 625 feet and beam of 75 feet. They carry an average of 17,600 DWT at summer Seaway draft, and have a maximum carrying capacity of 26,984 tons. Federal Commerce is presently building 730 foot class vessels for this trade having a summer capacity of 25,000 DWT. Their principal Seaway business has been to ship steel in and grain out, but since steel imports are off, ships are returning in ballast. They see an opportunity for international coal shipments in the future, however they believe that overseas shipments will be in colliers that are much too large for the Seaway. For example, a ship presently under construction for coal transshipment at Quebec City has a length of 875 feet, a beam of 141 feet, and a draft of 54 feet.

Federal Commerce favors a one to one and one-half month season extension for the Seaway. They would like to see that extension coupled with a firm commitment to remain open because they could not afford to have a ship stuck in the Seaway all year. Federal Commerce has no problems using its ships elsewhere off season.

Federal Commerce sees pilotage as the big problem with the present Seaway System, particularly at the Welland Canal. Waiting for pilots creates delays and expense. They would also like to have dual locks at the Welland, plus longer and wider locks to permit the use of larger ships.

Federal Commerce and Navigation is the only fleet operator dedicated to the combined lakes/ocean trade. The other international traffic coming into the Seaway System consists of tramps, that is, ships that are leased to enter the system for a single season or for a single trip. Since this is not dedicated traffic, it is highly elastic depending on demand.

Tramps are relatively smaller as compared to lake traffic. They generally have a length of about 550 feet and beam of 70 feet, but they would ordinarily be operated at sea at a draft about 8 feet deeper than the 26 feet permitted in the Seaway. Because of the draft limitation, and because of their typical ocean-going V hull construction, they only carry about 8 to 14,000 DWT through the Seaway. Since they have a

small load and they lock more slowly than the lakers, tramp traffic generally results in an under utilization of the Seaway System.

Tramp operators have a low interest in navigation season extension, but they would probably come in during the extended season if commodity demand were high and there was a guarantee that the Seaway would remain open. Tramp operators have no problems in scheduling their ships for other trade in the off-season.

Tramp operators also cite the problem of pilotage at the Welland Canal. They are not, however, looking for a larger lock system. They have a great many ships available now that meet Seaway limitations of length and beam, and they do not believe that increasing lock size would increase the number of ocean-going ships in the system.

5. GREAT LAKES SHIPYARD INTERVIEWS

There are four major shipbuilding yards in the Great Lakes area, two U.S. and two Canadian. One additional U.S. yard is available but it is not presently in the shipbuilding business. One other large Canadian yard is currently only used for repairs, but has the potential to build a 730 foot ship. Shipyard capacity is shown in Table 3 below. Estimates of annual capacity are approximate.

TABLE 3 U.S. AND CANADIAN SHIPYARD CAPACITY

YARD	MAX. LENGTH (ft)	ANNUAL CAPACITY
THE AMERICAN SHIPBUILDING COMPANY		
Toledo	730	2
Chicago	730	1
Lorain	1025	1
BAY SHIPBUILDING CORPORATION		
Sturgeon Bay, WI	1000	1
	604	1
ERIE MARINE DIVISION OF LITTON INDUSTRIES		
Erie, PA	No Current Shipbuilding Operations	
COLLINGWOOD SHIPYARDS		
Collingwood, Ontario	730	2
PORT WELLER DRY DOCKS		
Port Weller, Ontario	730	1

There are plans at several of the shipyards to improve repair facilities. In addition, the Collingwood Shipyard is working on a plan to build a 1300 foot dry dock that would permit construction of 1000 foot ships.

Shipyards are not currently operating near capacity, although some fleet operators might have a delay in obtaining

ordered ships. During the early to mid 1970's, shipyards were operating close to capacity and there was some delay in obtaining ordered ships, however, in general shipyard capacity can be expected to expand in the long term to meet demand. It should be noted that Canadian fleet operators do not order from U.S. shipyards because although the costs of construction are about the same, an additional 25% duty is levied on U.S. built ships.

Interviews with shipyard operators show that some, but not all ships are presently constructed for operating in ice (See pages A-31 through A-35). On a national basis, most Canadian ships are constructed for ice and most U.S. ships are not. Shipbuilders do not believe that winter operations will have a significant effect on a ship's life, but they all admit that operations in ice increases maintenance costs.

6. GREAT LAKES PORT AUTHORITY INTERVIEWS

Port authorities at thirteen major Great Lakes ports were contacted to discuss port capacity and possible servicing problems. This survey showed that Great Lakes ports are currently under untilized. Traffic estimates indicate that ports are operating at about 25 to 60% of desired caapcity. There is virtually no waiting for servicing.

Some ports are expecting increases in port traffic. Both Duluth and Superior expect increases in grain shipments, and both anticipate an opportunity to enter the export coal market. Ashtabula, Conneaut, and Toledo, Ohio all have a substantial coal handling capability and could easily enter the international market. Buffalo, New York also has significant coal loading capability.

Port authorities are all interested in extension of the navigation season, generally the longer the better. Many northern and Lake Erie ports do have ice problems and would require icebreaker assistance for season extension. Ports with ice problems favor a season extension to 10 or 11 months.

7. GREAT LAKES SHIPPING ASSOCIATIONS INTERVIEWS

Three Great Lakes shipping associations were contacted to determine future estimates of fleet mix and possible shipping problems. These associations include the Dominion Marine Association, a Canadian association of lakes shippers, the Lake Carriers Association, a U.S. association of lakes shippers, and the Shipping Federation, a Canadian association of ocean/lakes shippers.

The discussions with the shipping associations tend to confirm the information obtained from fleet operators, but there are some differences in emphasis that merit a comment.

The Dominion Marine Association notes that grain shipments, one of the largest bulk commodities currently moving on the lakes, are presently being made in ships that are about 660 feet in length. Some of this traffic could be taken in 730 ft ships, which would increase Seaway capacity. Dominion Marine also notes that a great many of the smaller ships handle intra-lake shipments and do not use the locks systems. Since a preponderance of Class IV and below ships handle petroleum products and package freight, this indicates that vessels of Class IV and below are likely to have a minimal impact on tne capacity of the Seaway system.

The Lake Carriers Association confirms the view of fleet operators that larger ships are more economical to operate, and therefore will be used instead of smaller ships whenever possible. The size of the ship is limited by locks restrictions, but more generally by port restrictions. Less than maximum size ships are needed to serve customers in small ports. These smaller ships will be required as long as the commodity demand remains and port conditions are not changed. When demand is slack because of business conditions, the largest ships are generally used while the smaller ships remain idle. This has been particularly true during slack periods in the steel industry. As a general trend, the U.S. Great Lakes fleet is being reduced to fewer, but larger ships.

The Lake Carriers Association also notes that the competitive position of ship transport in comparison to other modes of transportation is affected by Seaway charges. The Soo Locks system does not have a toll, but the Welland Canal and St. Lawrence Locks do. There has been some discussion of linking improvements to the Welland Canal to user charges so that an improved system would be paid for by the users. The Carriers

Association representative points out that traffic may be reduced by high tolls, and that the Seaway System then may not be competitive with other modes of transportation.

Concerning Seaway problems and suggested improvements, the Carriers Association representative points out that channels are not always maintained at project depths. There is need to "cut off the high spots" along the channel to maintain depth. There is not much of a problem with sharp turns in the channels because the larger ships have bow and stern thrusters. To improve the system, the Association representative believes that a second large lock should be built at the Soo and that the navigation season should be extended through 31 January.

The Shipping Federation representative cites the chief problem with the present system to be the delays experienced going through the Welland Canal. Delays are particularly severe late in the season when there is a rush to make the last trip. At these times delays at the Welland Canal can be five days or more. To improve the system, the Shipping Federation would like to see preference given to larger ships. Lock capacity is low because smaller ships go through the system cheaply, but the real cost of a lockage is nearly constant for all ships.

8. CURRENT FLEET MIX

The current fleet of Great Lakes ships is a matter of record. The ship sizes shown in this analysis are taken from "Greenwood's Guide to Great Lakes Shipping" using the edition dated April 1980. Bulk freighters and self-unloaders are considered as the primary fleet affecting Seaway system capacity since other principal categories of vessels, tankers and package freighters, are all Class 4 vessels or smaller. These smaller vessels are often only engaged in intra-lake transport, and therefore these vessels have only a slight impact on the capacity of the system.

8.1 Current Great Lakes Fleet

Figure 1 shows the current U.S. Great Lakes fleet of bulk freighters. In terms of ship numbers, the fleet is primarily composed of Class 5 ships, that is, ships with a length of 600 to 649 feet and a carrying capacity of about 15,000 DWT. The present Canadian fleet, shown in Figure 2, is predominantly Class 7 vessels, with a nominal length of 700 to 749 feet and a carrying capacity of about 26,000 DWT. None of the ships in the Canadian fleet are actually longer than 730 feet since this is the maximum size vessel that can be used in the Welland Canal or the St. Lawrence River.

Figure 3 shows the combined U.S. and Canadian Great Lakes fleet. The percent of each class of ship will be used to verify the baseline fleet mix for the Seaway system capacity analysis.

8.2 Fleet Building Trends

The projection of a future fleet mix begins with recent trends in lakes fleet shipbuilding. Figure 4 shows the U.S. vessels registered between 1958 and 1980 according to class. The base year of 1958 was selected because that year marks the opening of the upper St. Lawrence Seaway System, which established a maximum vessel length of 730 feet for that section. This record shows that the older Class 5 and 6 vessels are being replaced for the harbors that can only accept these vessels, that some "Seaway" Class 7 vessels are being built for the U.S. fleet, and that there is a trend to build larger vessels for the ports that can accept them. The new vessels of Class 4 and below are used for intra-lake transfer of petroleum products, chemicals, newsprint, and package freight.

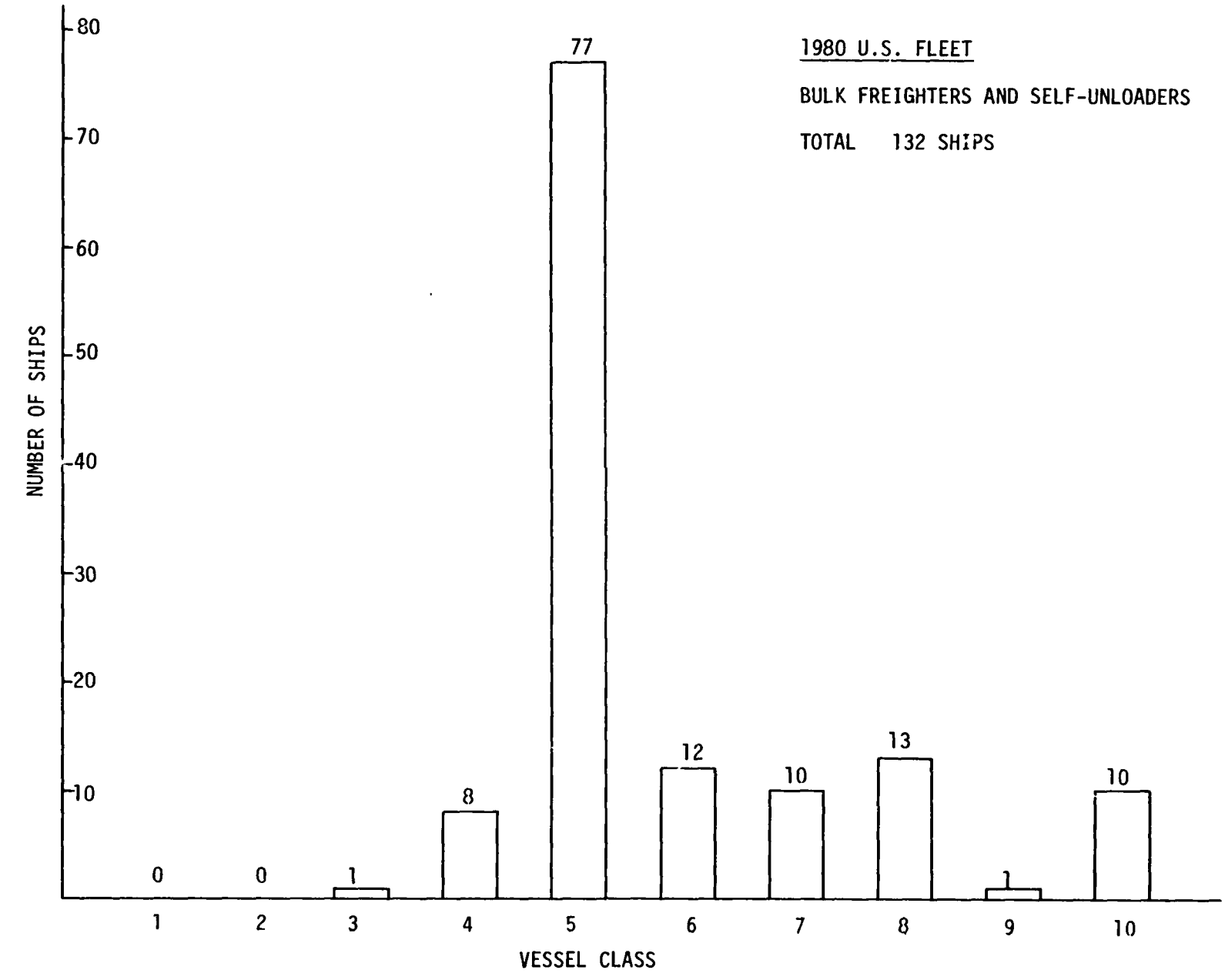

FIGURE 1 U.S. GREAT LAKES FLEET-BULK FREIGHTERS AND SELF-UNLOADERS

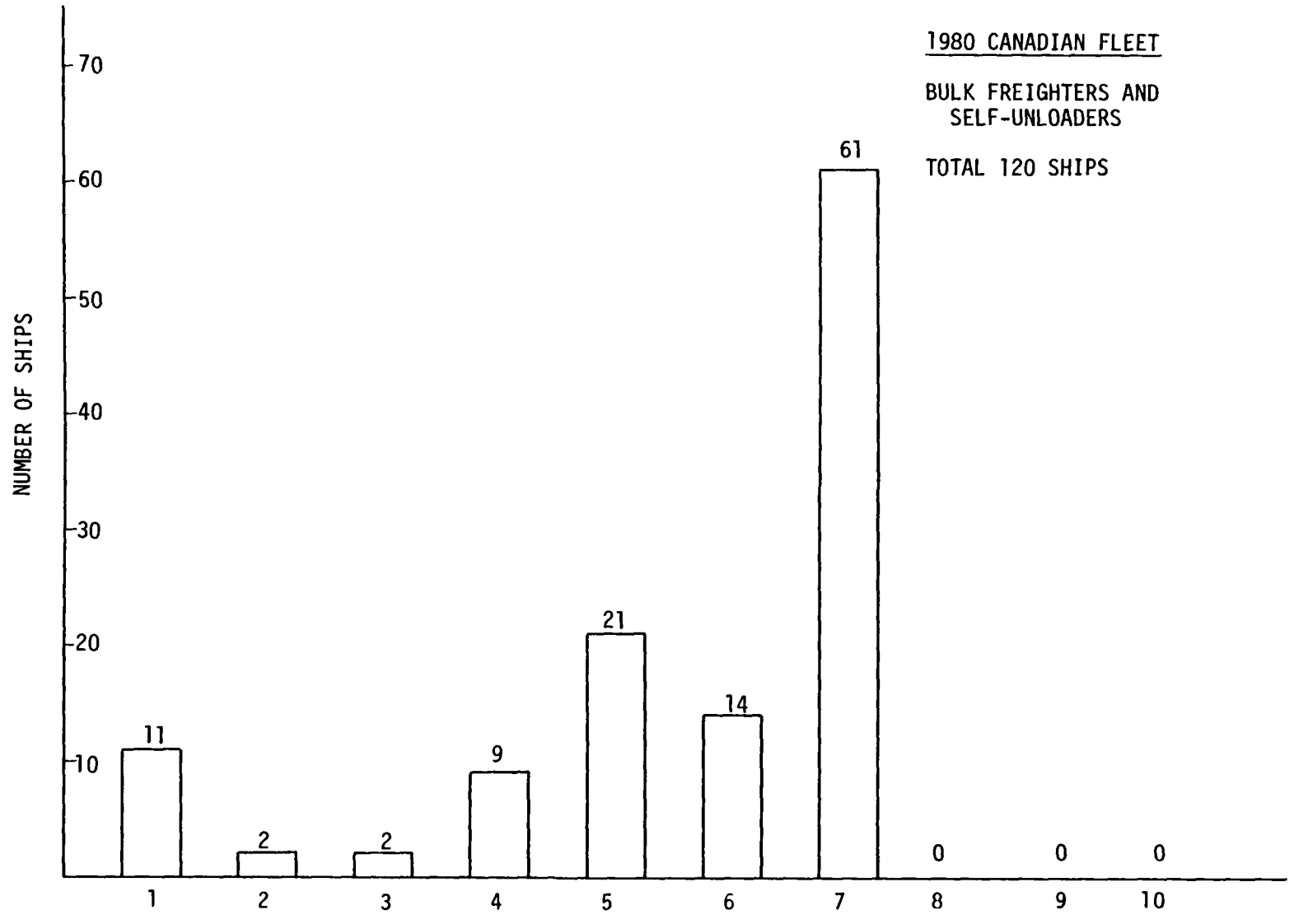

FIGURE 2 CANADIAN GREAT LAKES FLEET - BULK FREIGHTERS AND SELF-UNLOADERS

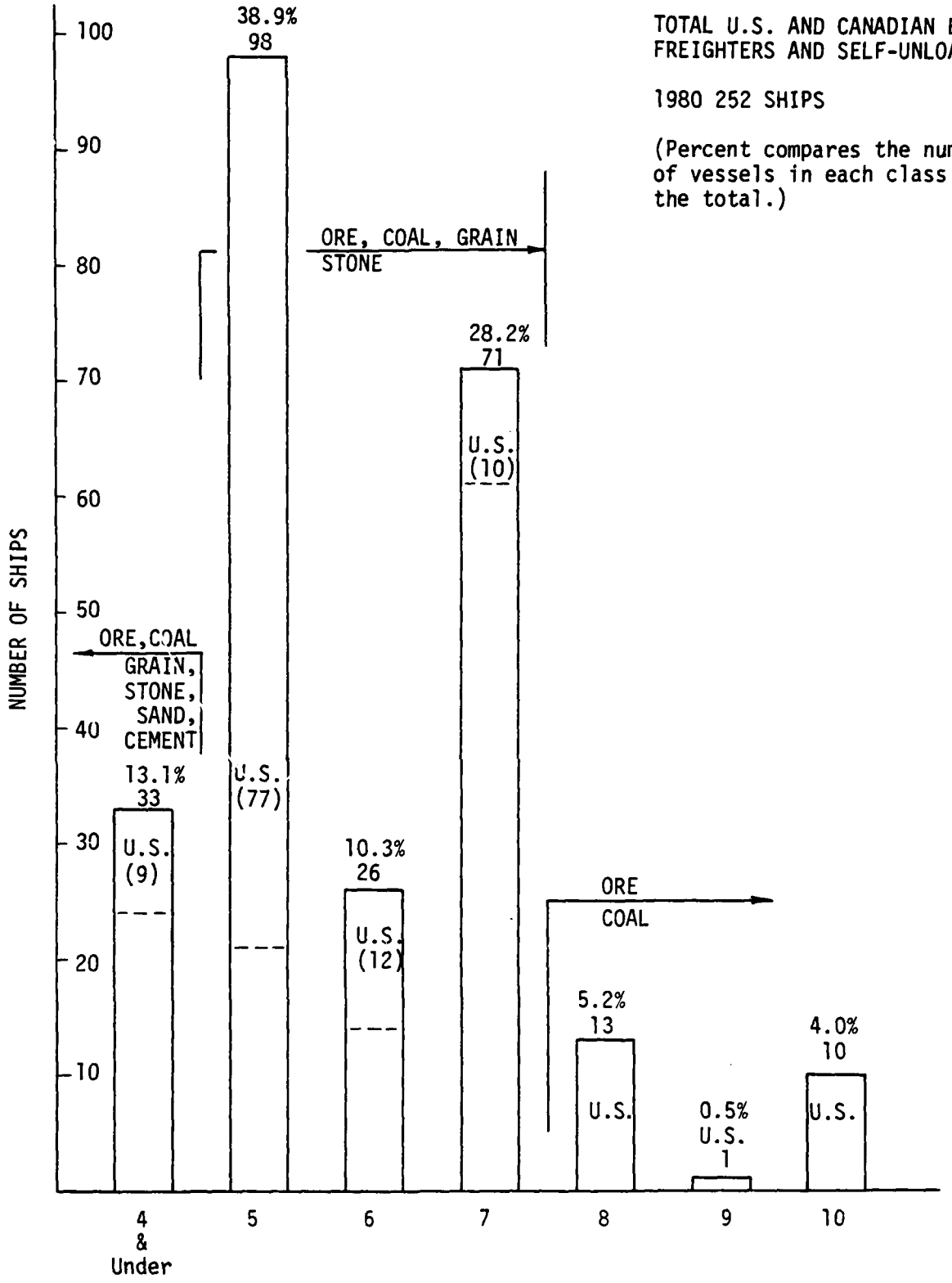

FIGURE 3 U.S. AND CANADIAN GREAT LAKES FLEET - BULK FREIGHTERS AND SELF-UNLOADERS

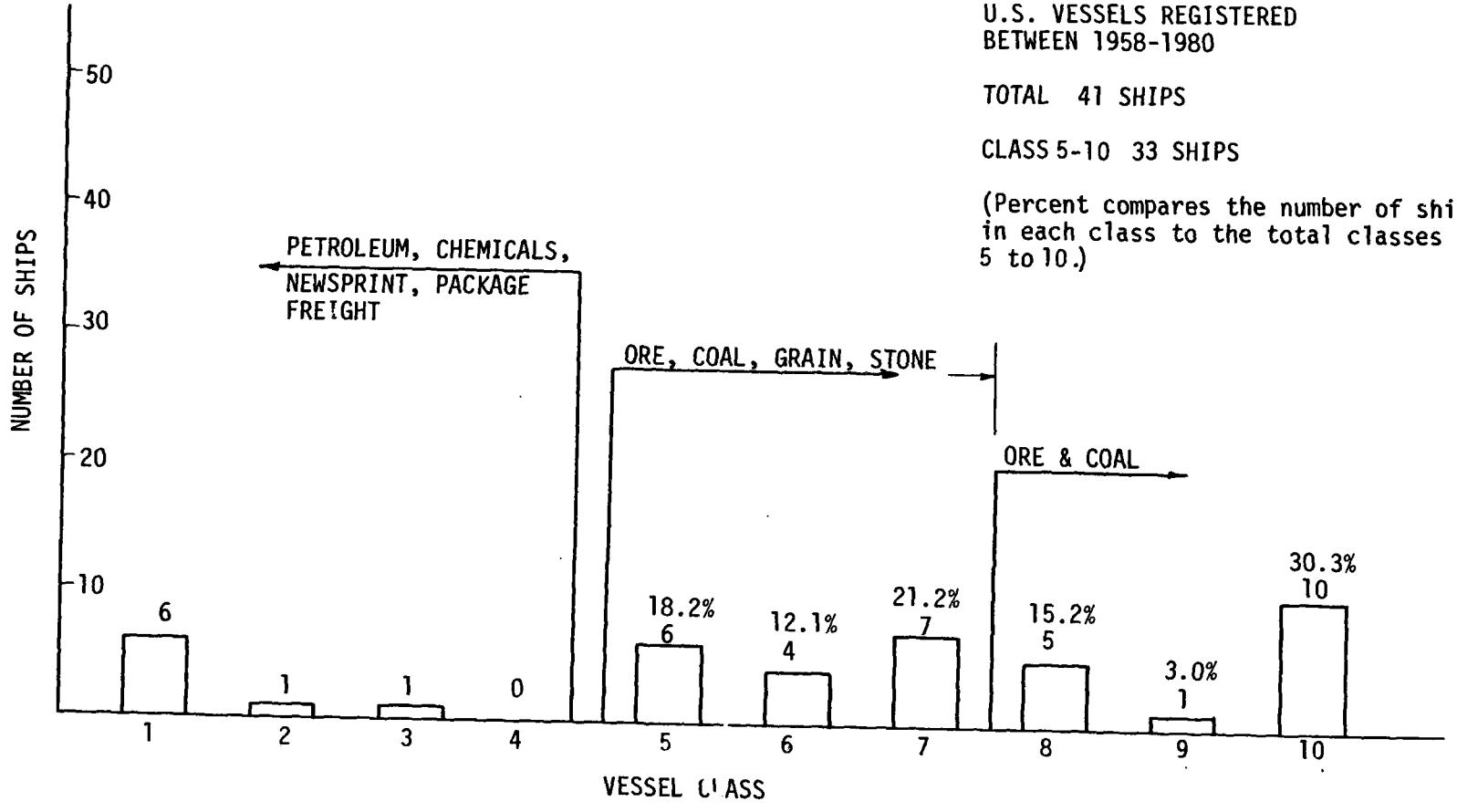

FIGURE 4 U.S. VESSELS REGISTERED BETWEEN 1958 AND 1980

As a result, these vessels do not make a significant contribution to determining Seaway capacity since the principal commodities are ore, grain, and coal.

Figure 5 shows the Canadian vessels registered between 1958 and 1980. The Canadian fleet has continued to increase in smaller class vessels, but the preponderance of building has been in the "Seaway" Class 7 ships. The Canadian fleet has not added vessels larger than Class 7 , but there is some talk of building 1000 footers for grain transshipment to the Welland Canal. As in the U.S. fleet, new ships in Class 4 and below are constructed for petroleum, chemicals, newsprint, and package freight.

Figure 6 shows the combined U.S. and Canadian building between 1958 and 1980. This distribution of vessels highlights the Class 7 vessels that have been added since the St. Lawrence Seaway System opened.

To emphasize the more recent shipbuilding trends, Figure 7 shows U.S. and Canadian shipbuilding for Class 5 through 10 vessels in the period 1979 to 1980. This figure shows that the demand for Class 5 and 6 vessels remains strong to service the ports that cannot accept larger vessels. Canadian building in the Class 7 category continues to dominate new construction activity, but not to the extent of the earlier period. Building of Class 8 and 9 ships has faded, but building of the largest Class 10 ships remains strong. These recent trends in fleet growth are used later to project the expected fleet mix in future years.

A question was asked concerning the possibility of building ships beyond the current limit of 1000 feet in length, and specifically concerning the current and future status of the Coast Guard's existing 1000 foot vessel restriction. The information on this question was developed in an interview with an officer at the Coast Guard District in Cleveland [6].

The current limitation on vessel size is 1000 feet between perpendiculars, but there is one vessel that has a length of 1013 feet and it is permitted to go through the system. The current restriction on longer vessels involves a determination of the total impact that operating these ships has on the system and on the environment. Questions to be addressed must include the impact of larger ships on:

- The environment
- Channels

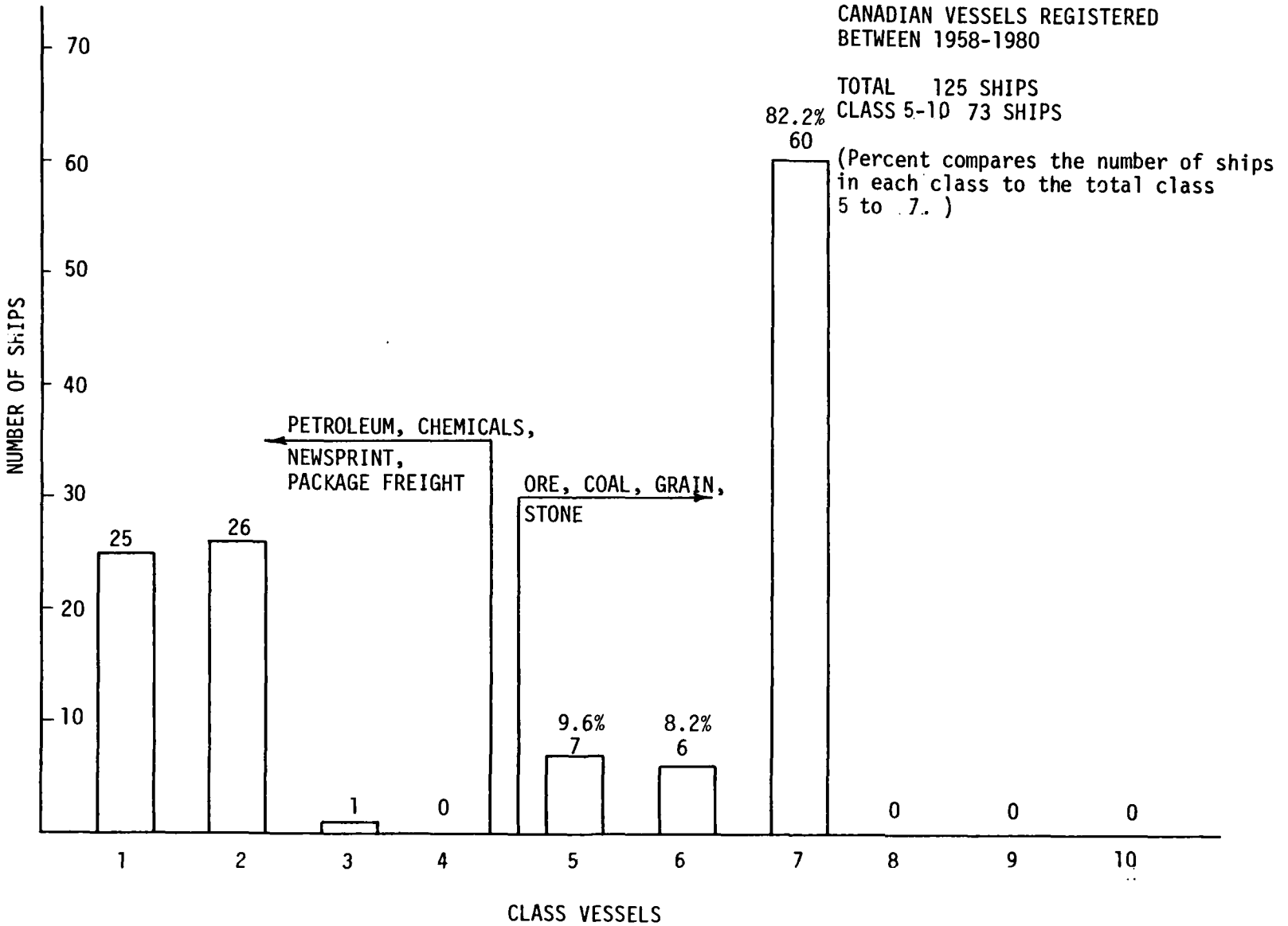

FIGURE 5 CANADIAN VESSELS REGISTERED BETWEEN 1958 AND 1980

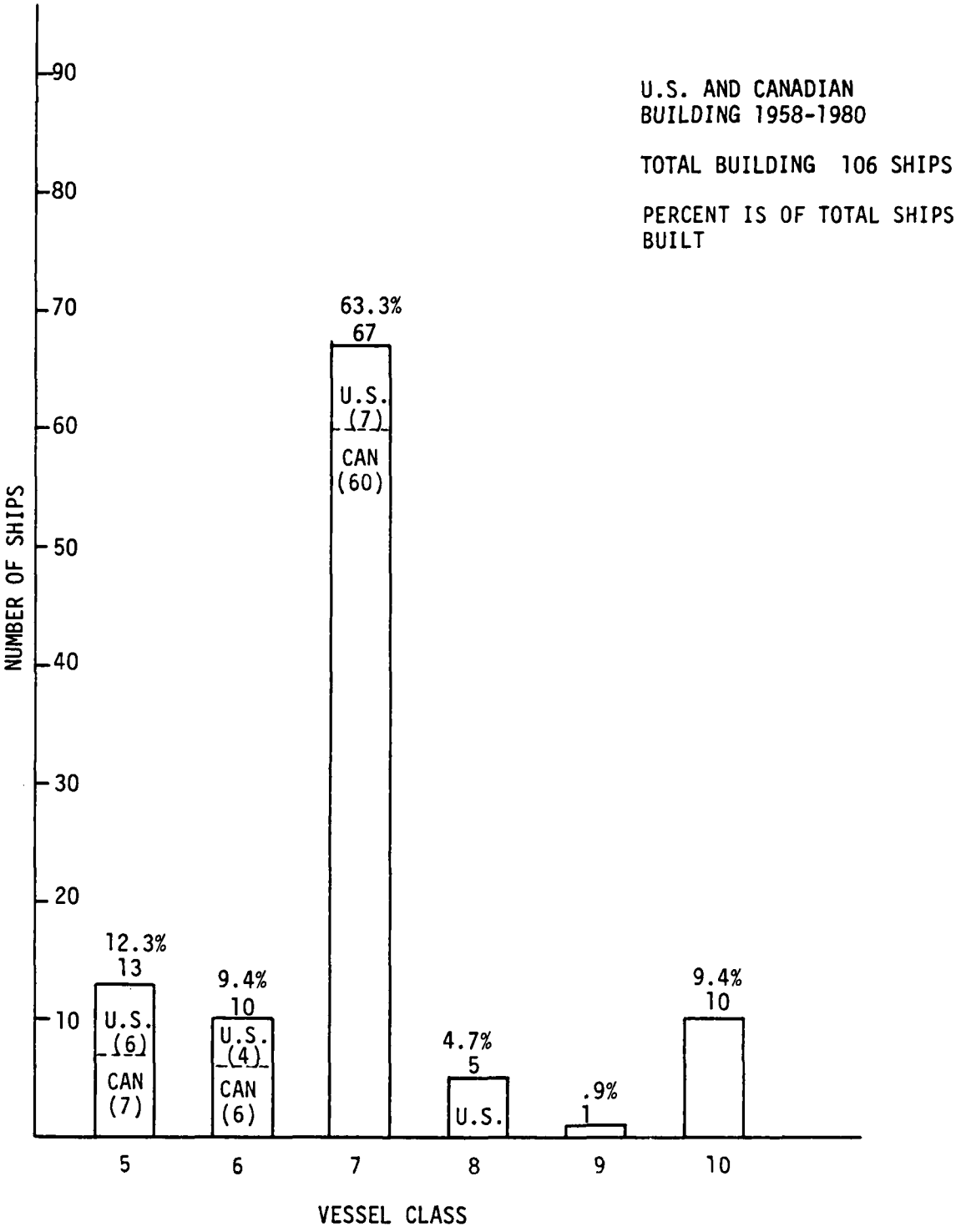

FIGURE 6 U.S. AND CANADIAN VESSELS REGISTERED BETWEEN 1958 AND 1980

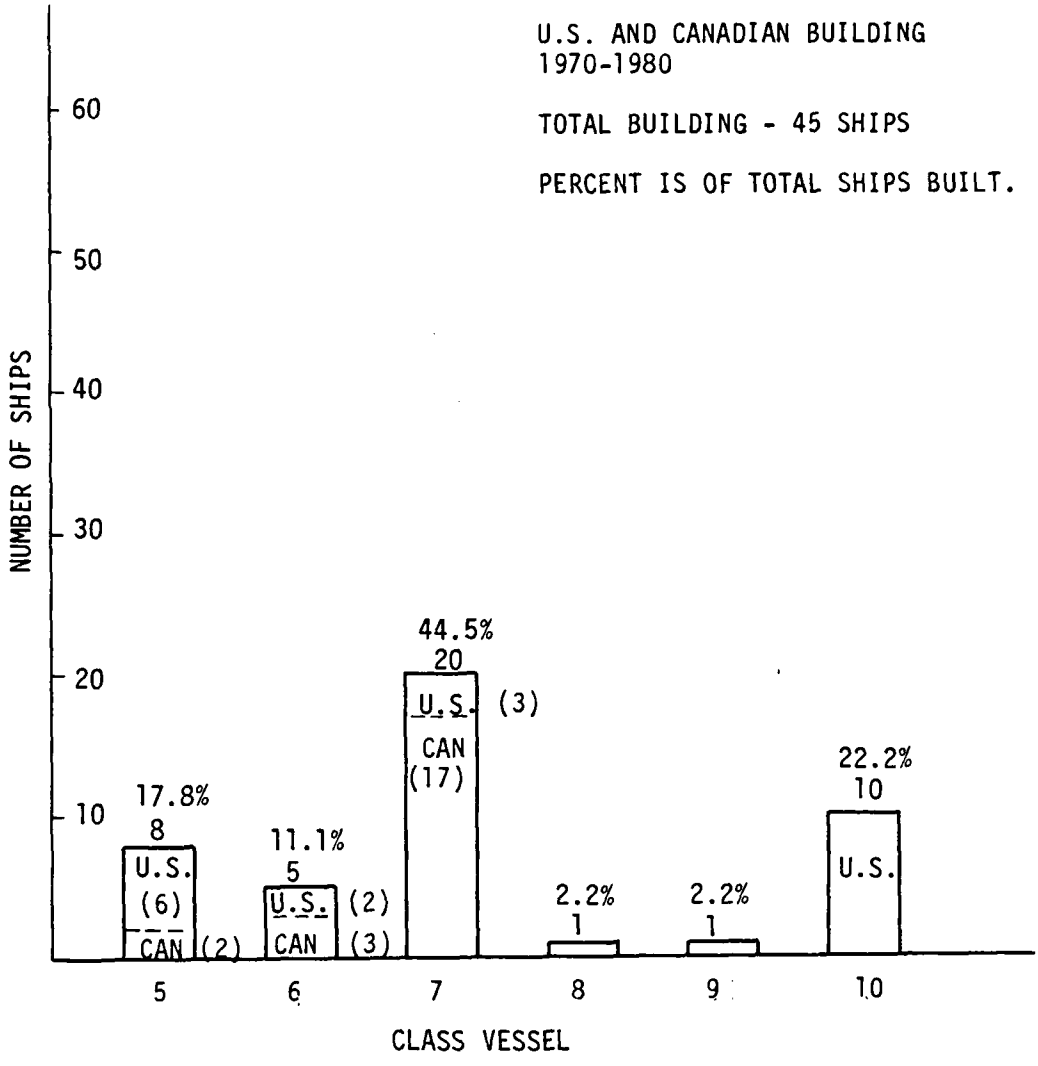

FIGURE 7 U.S. AND CANADIAN VESSELS REGISTERED BETWEEN 1970 AND 1980

- Ports
- Sharp turns
- Buoys and aids to navigation
- Capability of the entire system

The questions of required strength for larger vessels have been resolved. The Coast Guard position is that the firm or agency wishing to build the longer ship should conduct the necessary study. The Coast Guard would review this study and rule on whether the ship would be permitted in the system.

9. PREDICTING FUTURE FLEET MIX

Projections of future fleet mix in this analysis are based upon projected commodity demand. The way in which the fleet is estimated to grow depends on recent shipbuilding trends, such as the data shown in Figure 7, the way in which shipping authorities expect the fleet to grow, and changes to the Seaway physical system that are likely to result in changes in shipbuilding trends.

Fleet mix prediction occurs in two steps. First, a baseline fleet is established for a given waterway and locks system. The number of ships of each class in this fleet is based on the number of ship transits that have been recorded for that particular system. This fleet is also matched with a cargo carrying capacity for the baseline year. The second step is to update the baseline fleet to meet commodity demand projected for future years. The criteria used to develop the future fleet is different for each GL/SLS System scenario. Specifically, the future fleet depends on:

- Projected commodity demand
- Major changes in the type of commodity
- Changes in the GL/SLS System designed to increase capacity.

For example, if commodity demand follows current trends, and if no physical changes are made to the System, then additions to the baseline fleet will follow recent shipbuilding trends. If however, an unusual change is predicted for a commodity, such as a large overseas demand for coal, then the baseline fleet is expanded with a larger proportion of ships that could be expected to be built to meet the demand for carrying coal. Also, if a System expansion alternative includes physical changes to locks and channels, then the program for fleet expansion reflects shipbuilding trends that could be expected as a result of these physical changes.

Figure 8 shows how the model develops a new fleet at each lock system based on future commodity demand. The program begins by determining the time required for a round trip for each vessel, which depends on the vessel speed, the distance between ports, the time spent in locks, and the time spent loading and unloading. These variables are shown at the top of Figure 8. Together these quantities determine the time spent for each round trip. To determine the annual vessel capacity it is necessary to know the number of round trips made per year.

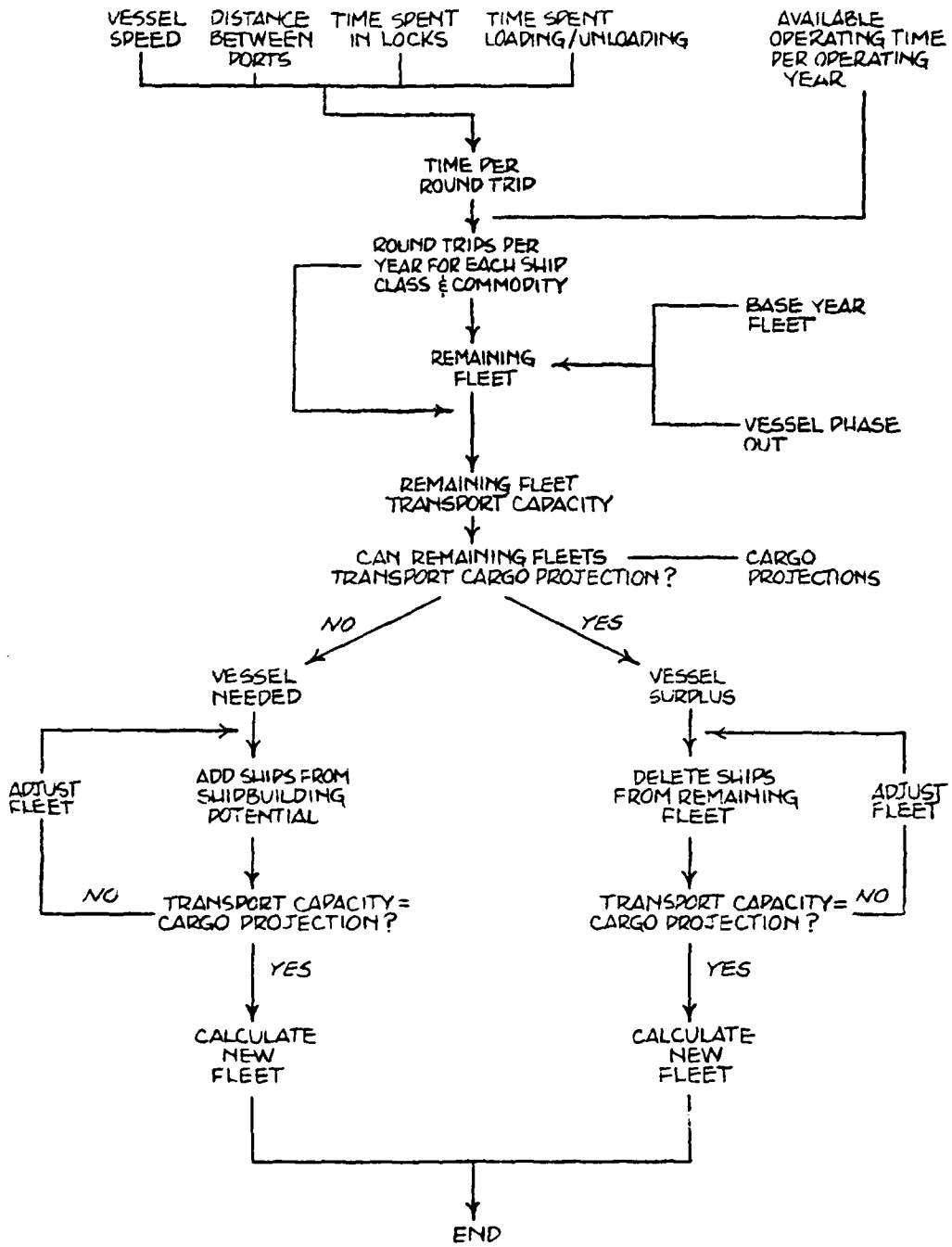

FIGURE 8 FLEET FORECAST MODEL

This is done by dividing the available operating time per year by the time required for a single round trip. In this model the computation is performed on a monthly basis because the time available for operation is variable from month to month based on seasonal operating conditions. Also the speed of the vessel may vary somewhat from month to month because of the operating conditions. Making the computation on a monthly basis also allows for capacity changes to be evaluated for season extension. During the extended season monthly operating times are lower because operations are limited to daylight hours and vessel speed are lower.

After determining the number of round trips each vessel class can make per year, it is possible to establish the total commodity carrying capacity for that fleet for the year. Figure 8 shows that for each year's fleet some vessels are added by new construction and some vessels are phased out. The remaining fleet and its carrying capacity is then compared to the projected commodity demand for that year. If the capacity of the remaining fleet does not meet the commodity demand, vessels are added; if the fleet has greater capacity than commodity demand, then vessels are deleted. After these changes are made, a new fleet is calculated and recorded for use in the capacity analysis. The method used to add and delete vessels is described in a paragraph that follows.

To use this fleet mix model to predict future fleets based on commodity demand, it is necessary to determine a baseline fleet as a starting point. Previous figures have shown the distribution of ship sizes in the U.S. and Canadian Great Lakes fleets. Although all of these lakes vessels can transit through the Soo Locks, not all of these ships are engaged in trade through the locks. In addition, many foreign flag ships transit the locks on a single trip or abbreviated seasonal basis. As a result, the "fleet" used to transport goods through the Soo Locks is not simply the sum of the U.S. and Canadian ships that can use the system. A baseline fleet has therefore been established using records of ship transits according to ship Class and commodity carried for a baseline year. This has been done in the "Great Lakes/St. Lawrence Seaway Lock Capacity Analysis" using a baseline year of 1976 [3]. The fleet using the three locks systems is then built from that baseline year to the most recent year for which there is a commodity transit record by changing the fleet to meet that commodity demand according to current trends of fleet additions and retirements. The baseline fleet for each of these systems is shown in Table 4. The numbers shown in Table 4 can be considered to be an initial baseline fleet. This initial baseline fleet is compared to the commodity demand for the most

TABLE 4 GL/ST. LAWRENCE SEAWAY

1976 FLEET

SOO LOCKS

CLASS	ORE	COAL	STONE	GRAIN	O BULK	G CARGO	TOTAL
4	0.0	1.4	.6	1.4	0.0	2.7	6.1
5	28.0	1.8	.8	3.8	1.1	0.0	35.5
6	2.1	5.5	.1	10.4	0.0	3.8	21.9
7	7.5	.3	0.0	14.6	3.8	0.0	26.2
8	6.6	0.0	0.0	0.0	0.0	0.0	6.6
9	1.0	0.0	0.0	0.0	0.0	0.0	1.0
10	2.0	0.0	0.0	0.0	0.0	0.0	2.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS	47.2	9.0	1.5	30.2	4.9	6.5	99.3

WELLAND CANAL

CLASS	ORE	COAL	STONE	GRAIN	O BULK	G CARGO	TOTAL
4	6.1	1.0	2.0	6.9	.4	3.2	19.6
5	1.6	.4	2.0	5.8	1.1	.5	11.4
6	0.0	0.0	0.0	21.0	6.4	10.1	37.5
7	8.2	1.5	.2	10.4	.6	0.0	20.9
TOTALS	15.9	2.9	4.2	44.1	8.5	13.8	89.4

ST. LAWRENCE SEAWAY

CLASS	ORE	COAL	STONE	GRAIN	O BULK	G CARGO	TOTAL
4	0.0	.9	.3	11.2	2.8	4.2	19.4
5	5.7	.3	.7	4.7	.4	.7	12.5
6	0.0	0.0	.4	22.1	7.4	11.4	41.3
7	6.4	.5	.1	7.9	0.0	0.0	14.9
TOTALS	12.1	1.7	1.5	45.9	10.6	16.3	88.1

recent year for which commodity transit records are available. This gives the exact number of ships needed for commodity demand for this recent record year. This fleet is then updated to meet the projected demand in future years.

Next consider an example of the way in which the fleet is changed to reflect future changes in commodity demand. Ships are added to the fleet based on records of recent shipbuilding trends for the baseline use, or based on a special distribution developed to meet the requirements of a particular scenario. As an example of how the fleet mix prediction model works, consider a fleet expansion formula based on recent shipbuilding trends. Figure 7 shows U.S. and Canadian fleet additions between 1970 and 1980 for Class 5 ships and larger. Assuming that additions to class 8 and 9 are unlikely, and rounding the numbers off, the assumed distribution of future fleet growth is shown in the second column of Table 5. The third column shows an average capacity of a ship by class, and the fourth column shows the capacity of a composite ship. The "Composite Ship" is the product of average ship capacity and the fraction of each ship class that is expected to be added in a year. The sum of the composite ship capacity is the overall capacity that a unit ship added to the fleet would have if, in fact, ships are actually added according to the distribution shown in column two. Since the changes in commodity demand are shown by year, it is also necessary to determine the composite ship capacity per year. This is done by calculating the number of round trips each ship makes per year according to commodity class. The time each vessel spends in a round trip is a function of the round trip distance, the average vessel speed, the vessel carrying capacity, the loading and unloading rate, and the time spent in the locks. This computation is generally made in the computer using operating characteristics that have been validated for each vessel class. Computations were made by hand to develop the example shown in Table 5.

Once the time per round trip is determined, the number of trips made per year can be calculated by dividing the total time the system is open per year by the time required for a vessel to make a round trip. The results of these calculations for vessels of Classes 5, 6, 7, and 10 are shown in column 5 of Table 5.

Next determine the composite ship capacity per year. This is the product of the composite ship capacity per trip and the number of trips per year, that is, the product of columns 4 and 5. The result is shown in column 6. Column 6 is then totalled to determine the total composite ship capacity per year.

TABLE 5 GREAT LAKES FLEET INCREASE BASED ON INCREASED DEMAND

(1) CLASS	(2) % SHIPS ADDED	(3) SHIPS CAPACITY (K tons)	(4) COMPOSITE SHIP CAPACITY/ (K tons)	(5) TRIPS YEAR (Ore)	(6) COMPOSITE SHIP CAPACITY/ YR	(7) NUMBER SHIPS ADDED	(8) CAPACITY OF SHIPS ADDED
5	20	20	4.0	43.0	172.2	1.03	886
6	10	24	2.4	46.5	111.6	.52	580
7	45	27	12.15	45.7	555.3	2.31	2,850
10	25	60	15.00	41.4	621.0	1.28	3,180
			33.55		1,460 K tons	5.14	7,496 or 7.5 M tons

Now consider a typical problem of increasing the fleet size according to the plan described in Table 5 to meet an increasing commodity demand. Assume the ships are in the ore trade and that the increase in demand for ore carrying capacity is 7.5 million tons. This figure is typical of an annual change because it is the standard deviation of the ore carried through the Soo during the years 1970 to 1980. First, determine the total increase in ships required by dividing the increase in commodity demand by the total annual capacity of the composite ship. That is,

$$\text{Number of Ships Required} = \frac{7{,}500 \text{ K tons}}{1{,}460 \text{ K tons/ship}} = 5.14 \text{ ships.}$$

The number of ships required, 5.14, is then divided up according to planned class increases as shown in column 7. That is, 1.03 ships added to Class V is 20% of 5.14 ships, and so forth. Finally, to check to see if the ships added in each class will together be able to carry the increased commodity demand, column 8 shows the product of ship capacity, the number of trips per year, and the number of ships added; that is, the product of columns 3, 5, and 7. The sum of the numbers in column 8 is 7.5 million tons, which shows that the ships that were added will, in fact, be adequate to meet the additional commodity demand.

Table 5 shows the way the fleet is changed in the computer model for a baseline case in which future commodity demand follows current trends and there are no planned physical changes in the channels or locks. Some of the scenarios developed in this analysis call for a physical change in various locks systems. The trend in future fleet growth, represented by percent ships added, is therefore adjusted to represent the way the fleet is expected to grow in that scenario. For example, if a scenario calls for the Welland Canal to be expanded to lock 1000 foot ships, then the percent ships added would be changed to reflect the way in which the fleet is expected to expand to meet commodity demand using the larger locks. This system of predicting future fleet mix provides a level of flexibility that can meet the requirements of any proposed change to the GL/SLS System.

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APPENDIX A

GREAT LAKES/ST. LAWRENCE SEAWAY
INTERVIEW REPORTS

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

Algoma Central Railway
Sault Ste. Marie, Ontario, Canada

SHIPBUILDING PLANS

The firm plans to build one ship per year through 1983. Future shipbuilding could include salties or a combination of a saltie/laker. The firm sees a continuing requirement for expansion of the Great Lakes fleet.

SHIP MANAGEMENT POLICY

The largest ships are likely to be built first (730 x 76 feet), but the firm sees a future requirement for a medium size self-unloading ship. The oldest ships are not always scrapped first.

SHIPBUILDING PLANS BASED ON COMMODITY DEMAND

The firm projects a long-term demand for grain and coal.

CAPACITY OF SHIPYARDS TO MEET REQUIREMENTS

The Canadian shipyards are owned by the number one and number two shippers, therefore the firm believes that they could not order a ship now for delivery in 1985. Canadian operators would not use U.S. yards because of a 25% duty that is required.

EXTENDED SEASON NAVIGATION

The firm expects increased maintenance problems caused by extended season navigation. They also believe that they would keep their ships out of commission for one month annually for routine maintenance. If the season were to be extended, they would probably not go for the full 12 months.

The firm is presently geared up for extended season operations; they are building ships with better lines, icebreaking bows, and more power. The firm believes that extending the season is the key to increasing capacity and they are building ships to meet this requirement now. They hope to see a season that continues until 15 January.

PROBLEMS WITH THE PRESENT SEAWAY

Operations are limited by the draft in some harbors. Since the salties are dropping out of the Great Lakes trade, there were fewer capacity problems in 1980. The fleets using the system are not increasing since fleet expansion has been offset by retirements.

SUGGESTED CHANGES TO SEAWAY

If the locks were larger, the fleet operators would build larger ships. This would result in lower rates for customers. Grain and ore shipments are currently tied to the 730 foot ships. Costs of tolls and pilotage are currently too high.

COMMENTS

Currently grain is taken to Quebec for transshipment and ore is returned.

There is currently no Canadian presence on the ocean; Dominion Marine Association is interested in this program but the Canadian Government is not. Algoma is currently building ships to go to the mouth of the St. Lawrence Seaway. Building a dual purpose saltie/laker would require greater strength, more fire fighting equipment, and more navigation equipment.

Smaller ships are built now because of river and harbor limitations. If these limitations were removed, larger ships would be built and freight rates would be lower for small communities.

Shipbuilding plans are currently being deferred to see what will be done with the Welland Canal. Longer and wider capacity ships would be good, but they doubt these kind of changes will be made. The firm believes that a larger canal without deeper draft is contrary to logic.

An example of how deeper draft ports could help to solve shipping problems; in 1979 a shipment of salt was taken out of Goderich in 124 loads. If the harbor had a 26 foot draft, only about 90 loads would have been required.

The firm expects an increase of 12% in general costs and 15% in wages in 1981.

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

American Steamship Company
Buffalo, New York
19 ships

SHIPBUILDING PLANS

The firm is presently at the end of a nine year construction program. They have one ship under construction now but they have no further plans for construction.

SHIP MANAGEMENT POLICY

The largest ships are not necessarily built first; ships are built to suit a specific trade. 1000 foot ships are only built for a contract because of the limited number of ports where they can call.

The smallest ships are not scrapped first. Small ships have an economic value for specific customers, therefore the size of ship does not limit its value. Ships are retired with an average age of 50 to 60 years.

SHIPBUILDING PLANS BASED ON COMMODITY DEMAND

There is a demand for coal for generating companies. There is also demand for ore, limestone, sand, and gypsum. There may be a future demand for transshipment of coal.

CAPACITY OF SHIPYARDS TO MEET REQUIREMENTS

The firm has no problems, the capacity of Bay Shipbuilding is adequate.

EXTENDED SEASON NAVIGATION

Winter ice is hard on ships. There is often plate damage to bow sections. The firm will avoid operating all winter. Their ships are not ice class and new construction ships are not being designed for ice.

PROBLEMS WITH THE PRESENT SEAWAY

It would be a big advantage to be able to load to 30 to 34 feet. Most newer ships can load to 29 feet now. Depth

American Steamship Company, (Continued)

is critical to efficient operations. Small ships are built to meet harbor requirements and depth is the most restrictive dimension.

SUGGESTED CHANGES TO THE SEAWAY

Increase dimensions to permit the use of deeper draft, wider ships; length is not critical. Need to widen the Welland Canal. For ideal ship dimensions, a 1000 foot ship should be about 200 feet wide; a 730 foot ship should be about 100 feet wide. Deeper draft is also required.

COMMENTS

The firm expects an increase in the coal trade. Coal is presently coming from Lake Superior but later eastern coal may come through the system from Lake Erie and Lake Ontario.

The firm is not presently building small ships but they are saving old ones. Most ships go into small harbors at less than maximum draft. Length is also a problem; long ships cannot go up rivers because there is no room to turn.

Smaller ships (550 to 680 feet, 10,000 to 22,000 tons) don't go through the locks often; they are generally used for short runs.

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

Canada Steamship Lines
Montreal, Quebec, Canada
33 ships

SHIPBUILDING PLANS

Six ships have been built in the past five years - three self-unloaders and three bulkers, all 730 foot. Currently two self-unloaders are being built for the ocean trade. These ships could be used to carry coal.

SHIP MANAGEMENT POLICY

The firm would build 1000 foot ships or even 1200 foot ships for the upper Lakes trade.

Smaller ships are generally dropped first. The firm's package trade is down from eight ships to three ships. Presently steam ships are being converted to diesel using heavy fuel.

The oldest ships are generally scrapped first based on engine efficiency and size.

SHIPBUILDING PLANS BASED ON COMMODITY DEMAND

Grain is the deciding commodity for bulkers. The coal demand for electric power is static. Canadian steel demand is increasing.

CAPACITY OF SHIPYARDS TO MEET REQUIREMENTS

The firm reports some problems in obtaining ships even though they own their own shipyard. Some ships are bought overseas, but only British ships because all others have a 25% tax.

EXTENDED SEASON NAVIGATION

Winter navitation is hard on ships and accidents increase. Some provisions have been made for operating in ice; bows are modified for ice and ships have more power.

Canada Steamship Lines (Continued)

PROBLEMS WITH PRESENT SEAWAY

The present Seaway is not built to ideal ship parameters. There is a problem with congestion at the Welland Canal.

SUGGESTED CHANGES TO THE SEAWAY

Increasing the size of the Seaway for longer and wider ships would be good, but some port facilities cannot handle the widest ships.

Channels could be marked better. The salties are not well equipped to handle the locks and therefore cause some delays.

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

Cleveland-Cliffs Steamship Company
Cleveland, Ohio
14 ships

SHIPBUILDING PLANS

One 1000 foot ship is planned to carry coal for Detroit Edison.

SHIP MANAGEMENT POLICY

The largest ships are generally built first based on known requirements. The smallest ships are generally scrapped first unless they have a special trade. Small ships cannot compete with large ones. The oldest ships are not scrapped first; it is a matter of economics.

SHIPBUILDING PLANS BASED ON COMMODITY DEMAND

Overseas coal shipment could affect the demand and building programs.

CAPACITY OF SHIPYARDS TO MEET REQUIREMENTS

No problems with yard capacity.

EXTENDED SEASON NAVIGATION

The firm would like to see a flexible winter closing but not year-round navigation.

PROBLEMS WITH PRESENT SEAWAY

The present Seaway should have wider and deeper channels. There is a problem at the Soo with only one large lock.

SUGGESTED CHANGES TO THE SEAWAY

There should be a new large lock at the Soo. The cost of shipping grain through the system may not be competitive because of the high costs of going through the Seaway.

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

Columbia Transportation
Cleveland, Ohio
16 ships

SHIPBUILDING PLANS

One 1000 foot ship is under construction and four ships are being converted to self-unloaders. One or two more will be converted next winter or the following winter.

SHIP MANAGEMENT POLICY

Only one maximum size ship is being ordered; the others are all smaller so that they can be used in more ports.

The smallest ships are retired first because of size, not age. There is no fixed age for retirement, but 70 to 75 years is typical.

The firm is gradually retiring smaller ships, therefore it is difficult to continue servicing small accounts. Small customers pay a high freight rate, so there is competition to keep these customers.

SHIPBUILDING PLANS BASED ON COMMODITY DEMAND

Commodity demand does affect shipbuilding but it is not possible to plan long range because the customers do not look far ahead. Utilities do more planning for the future but there is some retrenchment in power expansion. The firm does not believe that there will be overseas coal trade.

CAPACITY OF SHIPYARD TO MEET REQUIREMENTS

No problems. Bay Shipbuilding can meet requirements.

EXTENDED SEASON NAVIGATION

The firm does not favor extended season navigation; they have no interest in operating in ice. Connecting channels are a problem in winter. The ice destroys the vessels and there are crew problems. The firm has never made any

Columbia Transportation (Continued)

money during the extended season. Steel companies may be interested to avoid stockpiling.

PROBLEMS WITH THE PRESENT SEAWAY

The Soo Locks have a problem with vessels waiting; there is sometimes a line of 20 to 30 vessels. Current vessel size is in the range of 620 to 770 feet. As the vessel size increases, the waiting problem could increase. (This firm does not use the Welland Canal.)

SUGGESTED CHANGES TO THE SEAWAY

Build a new large lock at the Soo.

COMMENTS

The firm believes that East coast port improvements will take foreign coal trade. They do not believe that the coal dock capacity is available in the Lakes to meet the requirements of this trade.

Some ships only operate in a single Lake instead of trading between Lakes; about one-half of their fleet is engaged in these kinds of operations.

The firm believes that there is an excess of shipping capacity on the Lakes now.

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

HALCO, Incorporated
Westmount, Quebec, Canada
19 ships

SHIPBUILDING PLANS

The firm has no plans for construction now. They are currently buying used lakers or ocean ships to convert to lakers. The Canadian subsidy for shipbuilding has been reduced first from 40% to 20% and is currently 9%.

SHIP MANAGEMENT POLICY

The largest ships are not necessarily bought first; the size is appropriate to the trade. Tankers are never maximum size.

The smallest ships may be dropped first, but not always; it depends on the market. If there is a market for a ship, it is saved regardless of whether it is large or small, old or new.

There is no rule on ship age for retirement. A ship is saved as long as it meets requirements.

SHIPBUILDING PLANS BASED ON COMMIDITY DEMAND

Every ship is built with a specific market in mind.

CAPACITY OF SHIPYARDS TO MEET REQUIREMENTS

Yard capacity is taxed; there is a backlog of orders for 24 months. Fleet operators are yard owners, therefore they build their own ships first.

EXTENDED SEASON NAVIGATION

The firm is interested in extended season navigation if it is accompanied by a massive icebreaking effort. The firm considers the concept of extended season navigation to be unsettled and therefore they are not committing funds to special ships.

HALCO, Incorporated (Continued)

PROBLEMS WITH THE PRESENT SEAWAY

Channels need better navigation aids, particularly early and late in the season. The shunter idea should be dead. Instead increase the physical dimensions of the locks and channels. There is also a requirement for improved traffic handling capability at the locks.

COMMENTS

The markets for ships are for petroleum, grain, and ore. The maximum sized self-unloaders are currently being built for coal but they can handle any freely flowing commodity. It costs about $15 M for the self-unloader capability. The ships that use these unloaders are in the range of $34 to $40 M.

There is currently a strong demand for export grain, the limitation is the number of ships that the Seaway can move. There is also a new demand for coal. This coal may come out of Lake Erie to the St. Lawrence for transshipment at Quebec. There is a large market for steam coal out of the U.S. There are plans for up to five new coal ports. If these ports are developed, shippers will follow with larger fleets.

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

The Interlake Steamship Company
Cleveland, Ohio
10 ships

SHIPBUILDING PLANS

The firm has no plans for new ships but plans for conversions to self-unloaders. There are no long range plans for building.

SHIP MANAGEMENT POLICY

The largest ships are not always built first; the 730 foot ships cannot always get into ports such as the Saginaw River.

The Canadian fleet generally scraps smallest ships first. These are older, discarded U.S. ships. Eighteen ships 600 feet and smaller were retired this year. Ships are retired based on economics, not age.

CAPACITY OF SHIPYARDS TO MEET REQUIREMENTS

There were capacity problems in the early 1970's but not now.

EXTENDED SEASON NAVIGATION

Extended season navigation would cause no decrease in ship life but would result in increased maintenance costs. Shippers would like to have a navigation season that extends to the end of January ± 2 weeks. No one thinks there should be year-round navigation, only extended season. There is not enough Coast Guard help for winter navigation; they only help when you are stuck in the ice. The steel industry has a special problem for extended season operations. A few years ago they wanted to run all year in spite of damage, but this philosophy has changed.

The Interlake Steamship Company (Continued)

PROBLEMS WITH THE PRESENT SEAWAY

The firm has no special problems. They do not expect the channels to be made any deeper.

SUGGESTED CHANGES TO THE SEAWAY

The Soo needs a new large lock.

COMMENTS

There is a move toward specialty ships, that is, ships that carry both coal and cement. Future plans - everyone has a big fleet now. U.S. Steel could use some new ships, but generally the next few years could be slim as far as new construction is concerned. There will be some conversions to self-unloaders. There is not likely to be a new surge in shipbuilding, but the trade in grain will continue to grow.

Capital expenditures for pellet plants will go to Wisconsin and Michigan. Labrador pellet plants are also partly owned by U.S. firms, therefore these facilities are less likely to expand which will reduce the business of taking ore westbound and grain eastbound.

Future ore is more likely to come down from Laker Superior than from Labrador.

As the grain business grows, the firm expects some large ships (1000 foot) to be used to carry grain to Port Colborne for transshipment through the Welland Canal. The firm does not believe that the Welland Canal will be expanded.

Fleet operators are willing to continue to operate in January if there is business. The customer must be willing to pay for the cargo; sometimes the rates are twice as much as in the regular season. Shippers increase rates in winter to allow for ship damage.

Changes in the Welland Canal would only benefit foreign shippers. A 1000 foot, deeper Canal would invite Greek ships and foreign steel. Enlarging the locks would not be a benefit to U.S. or Canadian shippers or industry.

The Interlake Steamship Company

Large container ships plus rails may tend to take up what would be considered new capacity for the container traffic. When the Seaway was built, everyone put in general merchandise piers. These did not work out and now they are only used for truckers. Salties are not on the increase. The firm does not believe that an expanded Seaway would be a benefit.

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

Misner Transportation Ltd.
St. Catharines, Ontario, Canada
9 ships

SHIPBUILDING PLANS

No vessels are currently under construction or planned. The firm may require three 730 foot vessels in the future.

SHIP MANAGEMENT POLICY

Generally the largest ships are ordered. Usually the smallest ships are scrapped, generally ships that are less than 15,000 tons. The average age of a ship at retirement is about 55 years.

SHIPBUILDING PLANS BASED ON COMMODITY DEMAND

Increases in grain or coal trade will be reflected in a demand for more ships.

EXTENDED SEASON NAVIGATION

No special provisions have been made for ice-worthy vessels. The firm would welcome a one month extension to the present season.

PROBLEMS WITH THE PRESENT SEAWAY

There should be traffic rules that penalize small ships.

SUGGESTED CHANGES TO THE SEAWAY

Twin some of the locks at the Welland Canal, particularly lock No. 7. The Welland should have better traffic control.

The firm does not like the shunter concept.

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

N. M. Paterson and Sons, Ltd.
Thunder Bay, Ontario, Canada
14 ships

SHIPBUILDING PLANS

There are no current plans for expansion.

SHIP MANAGEMENT POLICY

The largest ships, in the 730 foot class, are generally built first and the smallest ships are generally scrapped first. The current fleet is about 25 to 30 years old.

EXTENDED SEASON NAVIGATION

The firm tries to use open water up to 15 December. There are no plans for winter navigation. The grain comes from Lake Superior where the ice conditions are so bad that they prefer not to operate in the winter.

They have one 315 foot ship that operates in the Lakes for overseas trade.

PROBLEMS WITH THE PRESENT SEAWAY

They have no problems with the present Seaway.

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

Quebec and Ontario Transportation Company, Ltd.
Thorold, Ontario, Canada
12 ships

SHIPBUILDING PLANS

The firm has no current building plans. They plan to acquire some U.S. tonnage, probably two 15,000 tons, 620 foot ships in the next two years.

SHIP MANAGEMENT POLICY

The largest ships are acquired first, in this case 620 foot ships. The smallest ships are not necessarily dropped first. Ships are retired after about 75 years. These ships have about a 21 to 22 foot draft.

SHIPBUILDING PLANS BASED ON COMMODITY DEMAND

Increased capacity is planned to meet the demand for grain and for transporting Lake Erie coal to the St. Lawrence Seaway. About 70% of the trade will be in grain.

The firm does not plan to get 730 foot ships. Two 730 foot ships carry more than on saltie load at Quebec, therefore, a 620 foot ship is used to top off the ocean ship after it has received one load from a 730 foot ship.

EXTENDED SEASON NAVIGATION

Extended season navigation would not have an impact on their operations. There is no demand for ocean ships in the Grat Lakes in the winter. This firm has smaller, low powreed ships and therefore they do not go past 15 December.

PROBLEMS WITH THE PRESENT SEAWAY

Generally transit times are good. The big problem occurs in winter. Salties come in as the season closes and this leads to congestion. The salties are slower in the system, particularly when they come in ballast.

Quebec and Ontario Transportation Company, Ltd. (Continued)

SUGGESTED CHANGES TO THE SEAWAY

There should be better fueling facilities at the Welland Canal. The ocean vessels take 6 to 8 times longer to fuel than the lakers. They do not come as quickly and they do not break away as quickly. Sometimes they take one or two days to fuel.

COMMENTS

They have no problems with using the oceangoing part of the fleet off season.

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

U.S. Steel Corporation
Great Lakes Fleet
Duluth, Minnesota
38 ships

SHIPBUILDING PLANS

The firm in all probability would build to adapt to the demand over the next ten years.

SHIP MANAGEMENT POLICY

The firm does not add all 1000 foot ships. They could also build smaller ships but they build the large ships for the areas that can handle them.

The smaller ships are gnerally dropped first, often because they are the oldest. The cost of operating per tone is the criteria for keeping ships along with physical constrints dictated by cargo location, draft in area, etc. There is no age limit for ships; they are used to the end of their economic life. The age of ships at retirement is between 50 and 60 years.

CAPACITY OF SHIPYARDS TO MEET REQUIREMENTS

Capacity is adequate but there is sometimes a wait for ships to be built.

EXTENDED SEASON NAVIGATION

Winter navigation may have some affect to ship life but the economics for operating in winter are good. The firm is presently operating ships for use in ice with a special bow plating and more power.

PROBLEMS WITH THE PRESENT SEAWAY

The Coast Guard should be used to systematically in the winter to keep channels open. The Coast Guard should do preventative icebreaking and not just react to emergencies as an operating policy. This is most cost effective for

U.S. Steel Corporation (Continued)

both the U.S. Coast Guard and vessel operators. There is also a requirement for improved ice management. There is a requirement for fixed aids to navigation in the winter plus land based electronic navigation systems.

SUGGESTED CHANGES TO THE SEAWAY

Only the upbound channel of the St. Marys River is used in the winter. This channel should therefore be dredged to a uniform 27 feet.

Duluth needs a one foot increase in harbor depth.

COMMENTS

The firm believes that realistic, step-by-step approaches should be taken toward extended season navigation. Extending the season to 31 January is considered to be a good first step; however, the desired closing date may change from year to year depending on the market and the weather. First plan to extend through January, plus or minus two weeks, then determine if a later date is desirable. The weather conditions and the market place should be the criteria. Plan, however, to give operators a "planned for" date each year in advance so if the market is available and weather permits, plans can be realistically implemented.

GREAT LAKES FLEET OPERATOR INTERVIEW REPORT

FIRM

Upper Lakes Shipping, Ltd.
Toronto, Ontario, Canada
25 ships

SHIP MANAGEMENT POLICY

The firm generally builds the largest ships first, but some self-unloaders are more efficient if they are smaller.

The smaller and older ships are generally dropped first. The age at retirement varies between 50 and 75 years.

SHIPBUILDING PLANS BASED ON COMMODITY DEMAND

The firm expects the demand for shipping to be up 50% by 1990. For the entire industry, they expect a demand for about 30 more self-unloaders and 25 more bulkers.

CAPACITY OF SHIPYARDS TO MEET REQUIREMENTS

They have no problems since they own the shipyard at Port Weller.

EXTENDED SEASON NAVIGATION

The firm is not bit on extended season navigation. The Canadian winter is more severe than the U.S. winter. Since the trade is from the Welland Canal to the Seaway, it would be necessary to keep the Seaway open from the Welland to the mouth of the St. Lawrence. From Kingston up it is much colder, therefore ships are less likely to go farther up the Seaway. Navigation is too difficult in the colder area. In the winter the system is locking more ice than ships. They are not interested in year-round navigation in the St. Lawrence.

COMMENTS

They expect an increase in grain exports from the West down the St. Lawrence to be transshipped overseas.

Upper Lakes Shipping, Ltd.

If the Welland is not expanded, they believe that the number of salties coming in will drop. Depending on the traffic, they may be forced out. The salties are not designed for the canal and therefore they are not as efficient as the lakers. Because of draft limitations, they waste about 8,000 tons on every transit. They average 12,000 to 16,000 tons coming through; the lakers carry 25 to 26,000 tons because they are designed differently.

Salties are less efficient and have problems with cross winds. They are slower locking through the canal. The salties will decrease because there will be less demand. The more efficient lakers will specialize in transporting through the canal for transshipment.

The Welland Canal is at capacity because the ships coming through are small. If ship size increased to the maximum allowable, transits would go down to 45%.

Increased tolls will affect the competitive position of the system.

The firm believes that it is reasonable to keep the Welland Canal open for another month. They could use the last three weeks to haul a large quantity of coal from Lake Erie to steel companies in Hamilton and also to Ontario Hydro.

Upper Lakes has two Seaway size self-unloaders and they are building two more for ocean trade. They also have three coastal self-unloaders. These ships spend about half their time out of the Seaway. Plenty of business is available for trade out of the Seaway.

Some new ocean ships are built for ice operations, but their lakers are not built for ice. The firm is currently downsizing engines to save fuel. This also decreases their capability to operate in ice.

People in the shipping industry do not believe that the shunters will work at the Welland Canal. People with ship handling experience do not believe the shunter system will be worthwhile.

OCEAN/LAKES FLEET OPERATOR INTERVIEW REPORT

LINES/AGENT

Calley Motorships Ltd.
Montreal, Quebec, Canada

NUMBER AND TYPES OF SHIPS

They currently have 600 transits per year for bulk using tramps that average 550 x 70 feet, draft 31 feet. Tankers have 57 passages per year; 26 oil barges, 31 chemical tankers for 2 M tons traffic per year. Tankers are 520 feet long and barges are 475 feet long with a 25 foot tug. Large tankers offload at Montreal and barges deliver fuel in the Lakes.

CARGOES

Cargoes are presently 95% grain from Thunder Bay and Duluth. Some steel imports are coming in, but 75% arrive in ballast.

FUTURE TRAFFIC

Firm expects an increase of 20 to 25%; 1979 there were 800 transits. Oil barge traffic is increasing.

SEASON EXTENSION

The season is long enough. It is hard to find Class AI (ice) ships; overseas shippers don't want to go in because of insurance and possible damage.

SEAWAY PROBLEMS

There is congestion in April, May, November, and December. There are problems with bad weather and a lack of pilots. There is a wait for Canadian pilots.

SHIPS USED OFF SEASON

Ships are used off season. There are no problems in finding other trade.

Calley Motorships, Ltd. (Continued)

PROBLEMS WITH SHIP SIZE

Currently ships carry 25,000 to 30,000 tons. Ships will continue to be built to Seaway size. The firm does not think that trade would increase if larger ships were permitted.

OCEAN/LAKES FLEET OPERATOR INTERVIEW REPORT

LINES/AGENT

Federal Commerce and Navigation Company
Montreal, Quebec, Canada

NUMBER AND TYPES OF SHIPS

The firm has 14 ships built for ocean/lakes trade. Currently these are 625 x 75 foot ships carrying 17,600 tons in summer. New ships will be 730 foot and have a capacity of 25,000 tons in the lower Seaway and 35,000 tons in the St. Lawrence Seaway.

CARGOES

The ships carry steel in and grain out. The steel business is down, so ships arrive in ballast and take grain out. The ships could also take coal out but grain has a higher return and is the preferred cargo.

FUTURE TRAFFIC

The firm believes there could be a coal market for 3 to 5 years. As soon as East Coast prots increase capacity, Lake traffic will not be able to compete.

SEASON EXTENSION

A 1 to 1-1/2 month extension would be good; the Seaway must be guaranteed to remain open. Shippers cannot risk the cost of a ship stuck in ice all winter. The 619 foot ships are ice strengthened, the 730 foot ships are not ice strengthened.

SEAWAY PROBLEMS

There is a problem with congestion at Welland. This could become worse if coal trade increases. Having Canadian and American pilots creates delays and expense.

SHIPS USED OFF SEASON

The ships are used off season. They are leased to USSR to get grain from other prots. There is no problem using ships off season.

Federal Commerce and Navigation Company (Continued)

PROBLEMS WITH SHIP SIZE

Shippers need larger vessels to be competitive. Colliers are now 138 K tons, 875 x 141 feet with 54 foot draft. These ships are more fuel efficient than smaller ships.

RECOMMENDED SEAWAY IMPROVEMENTS

There is a requirement for dual locks plus longer and wider locks. Solving the pilotage problem would increase the speed of passage through the Welland Canal.

OCEAN/LAKES FLEET OPERATOR INTERVIEW REPORT

LINES/AGENT

Manchester Lines Ltd.
Montreal, Canada

NUMBER AND TYPES OF SHIPS

This firm has two ships with an average length of 300 feet, for the container trade.

CARGOES

Large ships off load at Montreal where containers are shifted to small ships for delivery to Great Lakes ports. Water transshipment is cheaper than rail, but not much. Ships are also used to reposition containers in the Lakes.

SHIPS USED OFF SEASON

Off season ships are used between the U.K. and the Mediterranean or are sub-leased to another firm.

OCEAN/LAKES FLEET OPERATOR INTERVIEW REPORT

LINES/AGENT

Yugoslave Great Lakes Line
Chicago, Illinois

NUMBER AND TYPES OF SHIPS

The firm currently has 5 ships that are 470 x 64 feet and carry 8,000 tons. New ships will be 530 feet, 14,000 tons, but draft will be a problem.

SEASON EXTENSION

The firm is interested in season extension. They believe more ships would come in for an extended season. In winter there are problems with ice at entrances and exits to channels. Their ships are presently designed for use in ice.

SEAWAY PROBLEMS

The most important Seaway problem is draft; ocean ships cannot come in loaded.

SHIPS USED OFF SEASON

There is no problem using ships off season. Ships go to the Mediterranean; they take bulk like wood pulp from Montreal.

RECOMMENDED SEAWAY IMPROVEMENTS

Increase Seaway draft.

GREAT LAKES SHIPYARDS INTERVIEW REPORT

SHIPYARD

The American Shipbuilding Company
Lorain, Ohio

CURRENT ORDER BACKLOG

1 - 100 footer
2 - conversions; 780 foot ships to self-unloaders

Plan to build about 7 - 1000 foot ships in the next ten years.

YARD CAPACITY

	Length (ft)
2 - Toledo	730
1 - Chicago	730
1 - Lorain	1,025

PLANS TO EXPAND CAPACITY

No plans to expand capacity unless the Seaway opens to larger ships.

CONSTRUCTION FOR WINTER NAVIGATION

Some ships are ordered with icebreaking bows. The firm does not expect all ships to be built for ice because the lead ship will clear the channel.

EFFECT OF WINTER NAVIGATION ON VESSEL LIFE

Winter will not affect vessel life, but it will increase repairs. Winter operations require new propeller tips, bow thrusters, and shafts.

GREAT LAKES SHIPYARDS INTERVIEW REPORT

SHIPYARD

Bay Shipbuilding Corporation
Sturgeon Bay, Wisconsin

CURRENT ORDER BACKLOG

1 - 1000 foot
1 - 630 foot
1 - 730 x 78 foot (oceangoing, not intended for Seaway)*
- 600 x 76 foot notch barges, Gulf to East Coast, oil.

YARD CAPACITY

1 - 1000 foot
1 - 640 foot

PLANS TO EXPAND CAPACITY

The yard is expanding the carpenter shop and the pipe shop. They are doubling shop space and increasing seawall length.

CONSTRUCTION FOR WINTER NAVIGATION

The yard is generally not building ships for ice conditions. One 1000 foot ship is being built for ice operations.

EFFECT OF WINTER NAVIGATION ON VESSEL LIFE

Winter navigation increases maintenance problems but does not affect ship life.

VESSEL COST DATA

Currently a 1000 foot self-unloader costs about $50 M.

* Ships construction with a beam greater than 76 feet are granted a waiver for one passage out of the system to the ocean.

GREAT LAKES SHIPYARDS INTERVIEW REPORT

SHIPYARD

Collingwood Shipyards,
Division of Canadian Shipbuilding and Engineering
Collingwood, Ontario, Canada

CURRENT ORDER BACKLOG

6 - 730 foot ships to mid-1983

YARD CAPACITY

2 - 730 foot ships/year; average of about 1.5 ships/year.

PLANS TO EXPAND CAPACITY

The Federal Government and Provincial Government plan to assist in building a 1300 foot dry dock. This could be used to build a 1000 foot ship. The yard plans to double present dry dock capacity.

CONSTRUCTION FOR WINTER NAVIGATION

Ships are presently being built for ice conditions. Ram bows are installed to owners specifications.

EFFECT OF WINTER NAVIGATION ON VESSEL LIFE

Winter has an effect on ship's life, but it is not significant. Winter operations increase maintenance problems.

VESSEL COST DATA

Currently it costs $35 to $42 M for a 730 foot self-unloader.

GREAT LAKES SHIPYARDS INTERVIEW REPORT

SHIPYARD

Port Arthur Shipbuilding Company
Division of Canadian Shipbuilding and Engineering
Port Arthur

CURRENT ORDER BACKLOG

The yard does not build any full ships. They subcontract to Collingwood to build the forward end of ships and ship conversions. The dry dock is for ship repair and renovation.

YARD CAPACITY

The yard has the potential to build a 747 foot ships, but it presently used for repairs and conversions.

PLANS TO EXPAND CAPACITY

The yard is increasing steel work capacity. If the market developed, they could build 1-8,000 tons ship/ year. (In this case the dry dock could not be used for repairs.)

CONSTRUCTION FOR WINTER NAVIGATION

The yard is building ships for winter navigation, but for a limited amount of ice. They are not building full ice class vessels.

EFFECT OF WINTER NAVIGATION ON VESSEL LIFE

Maintenance is a problem in winter navigation.

GREAT LAKES SHIPYARDS INTERVIEW REPORT

SHIPYARD

Port Weller Dry Docks, Ltd.
Port Weller, Ontario, Canada

CURRENT ORDER BACKLOG

The yard has contracts through 1983, building one 730 foot ship at a time.

YARD CAPACITY

1 - 730 foot ship per year, about 50% ocean class vessels, 30-32 ft draft.

PLANS TO EXPAND CAPACITY

Ontario will provide funds to increase dry dock capacity.

CONSTRUCTION FOR WINTER NAVIGATION

The yard presently constructs ships for ice, Lloyd's Class 3.

EFFECT OF WINTER NAVIGATION ON VESSEL LIFE

Ships suffer some damage in ice. Great Lakes ships need icebreaking assistance to operate in winter.

VESSEL COST DATA

Ocean self-unloaders with an automated engine room and handling costs $48 to $50 M to build. Bulk carriers cost $30 to $35 M. Lakers cost $4 to $5 M less than oceangoing ships.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Niagara Frontier Transportation Authority
Buffalo, New York

SHIP SIZE CAPABILITY

No ship size limit at Buffalo; depth 27 feet at piers.

LOADING FACILITIES

Coal facilities available now; the port is receiving and shipping coal. They expect overseas coal to go straight out the Seaway, but not in U.S. ships.

FUTURE PLANS

The port has a five year master plan to improve port facilities and increase bulk storage area.

WINTER NAVIGATION

Minimal amount of icebreaking assistance would be needed to stay open. There are no problems with navigation aids.

SEASON EXTENSION LIMITS

The port is closed from 15 December to 1 April. An ice boom is deployed across the Niagara River.

COMMENTS

The port is interested in season extension. The best program would be to extend into January.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Burns Waterway Harbor
Indiana Port Commission
Portage, Indiana

SHIP SIZE CAPABILITY

The port can handle 1000 foot ships plus 730 x 76 foot ships; harbor depth 27 feet.

LOADING FACILITIES

There are no problems with loading and servicing; presently not enough traffic. The commodities handled in the port include iron ore, liquid fertilizer, dry fertilizer, coke, and scrap steel.

FUTURE PLANS

Cargill is completing a new grain elevator. Another berth is being built for bulk cargo.

WINTER NAVIGATION

The port is open to barge traffic all year. Some ice-breaking assistance and additional navigation aids would be required for winter operations.

SEASON EXTENSION LIMITS

The port recommends a 10 month navigation season.

COMMENTS

A guaranteed 10 month season would be a big help to business.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Chicago Regional Port District
Chicago, Illinois

SHIP SIZE CAPABILITY

No ship size limitations at Chicago.

LOADING FACILITIES

There are no problems with loading and servicing ships. Currently there are 24 berths available.

FUTURE PLANS

The port just added the Iroquois Lake Front Terminal - 194 acres, capacity of 1/4 M tons in containers per year. The terminal is right on the Lake, ships do not have to go up the river.

WINTER NAVIGATION

No problems with winter navigation; open all year for barge traffic. No icebreaking required.

SEASON EXTENSION LIMITS

No problem with any season extension.

COMMENTS

The port has no capacity problems; they just need to get the ships.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Cleveland - Cuyahoga County Port Authority
Cleveland, Ohio

SHIP SIZE CAPABILITY

The port can handle 1000 foot ships plus 730 x 76 foot ships; harbor depth 26 feet.

LOADING FACILITIES

Port is used mainly for international ships; private facilities are available for Lakers. Container ships call every 7 to 10 days in season.

FUTURE PLANS

The port has a license to build a foreign trade center at the mouth of the Cuyahoga River.

WINTER NAVIGATION

The port usually closes 15 December. They would require icebreaking assistance for extended season operations. Ice inside breakwater is 2-4 ft thick.

COMMENTS

The port does not handle wheat and coal. Some dry bulk offload capability so that Lakers can meet draft restrictions of the Cuyahoga River. No prospect of coal business, capability exists in adjacent ports. They believe that as east coast coal capacity is expanded, business would dry up in the Lakes.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Detroit-Wayne County Port Commission
Detroit, Michigan

SHIP SIZE CAPABILITY

The port has no restrictions on ship size.

LOADING FACILITIES

The port has facilities for steel imports, general cargo, container ships, bulk dry, and coke. There are no problems with waiting or servicing.

FUTURE PLANS

The port has ample facilities now; only about 25% of the capacity is used.

WINTER NAVIGATION

The port closes 15 December. The Canadian land bridge across Detroit River continues all year. Icebreaker service would be required for winter navigation; navigation aids are taken in during winter.

COMMENTS

Canadian land bridge is used for general cargo. It is cheapest route overseas. The land bridge is a ship/rail link, with rail over Canada. This could also be used for bulk such as coal or grain but it is generally used for general cargo.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Seaway Port Authority of Duluty
Duluth, Minnesota

SHIP SIZE CAPABILITY

The port can handle 1000 foot ships plus 730 x 76 foot ships; harbor depth 27 feet.

LOADING FACILITIES

Ore and coal facilities operate well, ocean or lake vessels may wait for grain elevators which have 12 berths. One new grain elevator is being constructed. Two old grain elevators have been closed but they have been acquired to Italgrani, USA, and will reopen.

FUTURE PLANS

Dreyfus will construct 70 M bushel storage capacity elevators at Superior, which requires $8 M in government funding. The port expects an increase in western coal exports and hopes to move coal directly overseas to Middle Europe ports. About $90 M in expansion facilities are planned for ore docks and port expansion.

WINTER NAVIGATION

The port has operated full season which requires icebreakers. The port should have a permanent Coast Guard icebreaker for winter navigation.

SEASON EXTENSION LIMITS

The port has fixed navigation aids therefore there are no problems in winter. The normal season extends from 1 April to 31 December.

COMMENTS

The port favors an 11 month navigation season and would remain closed in March.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Erie-Western Pennsylvania Port Authority
Erie, Pennsylvania

SHIP SIZE CAPABILITY

The port can handle 1000 foot and 730 x 76 foot ships.

LOADING FACILITIES

There is no waiting for port facilities, the port is under used. There have been no grain shipments since 1974, but they are considering plans for overseas shipments. They have facilities for loading 500 K tons of coal, some for overseas, some for Lakers. Currently the port imports ore pellets from Labrador; they have no ore trade with Lake Superior now.

FUTURE PLANS

Many ports in Europe can't handle large vessels, so that shipping coal overseas in 730 foot ships is about right.

WINTER NAVIGATION

The port will need tug service for extended season navigation; a large icebreaker is not required. There is only about 2 feet of ice in the harbor. Navigation aids are pulled in the winter; therefore some other system is required.

COMMENTS

The port favors a 10 month season to 31 January.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Brown County Board of Harbor Commissioners
Green Bay, Wisconsin

SHIP SIZE CAPABILITY

The port can service 730 x 76 foot ships and 735 foot ships up the river. Harbor depth is a problem. They are petitioning the Corps of Engineers for 27 foot harbor depth.

LOADING FACILITIES

The harbor has loading facilities for wood pulp and charcoal from Brazil. Outbound traffic includes USDA food products in sacks.

FUTURE PLANS

The port is considering a coal facility but not grain. Coal would be shipped overseas directly or for transshipment.

WINTER NAVIGATION

In an extended season, continuing traffic would keep the area open.

SEASON EXTENSION

The port has no season limits; that end of the Lake is open for full season navigation.

COMMENTS

The port believes they need to convince local consumers to take winter shipment rather than stockpile.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Lorain Port Authority
Lorain, Ohio

SHIP SIZE CAPABILITY

The port can handle 730 x 76 foot ships anywhere and 1000 foot ships at selected locations.

LOADING FACILITIES

There are no problems with loading facilities. They can load coke and ore pellets.

FUTURE PLANS

The port has no coal presently, but would like to establish coal capability both for direct shipment overseas and transshipment. There is a potential for new taconite facility development.

WINTER NAVIGATION

Icebreaker support would be required for winter navigation; navigation aids are pulled but not many are required.

SEASON EXTENSION

The season is from 15 December to 15 March, but generally no traffic arrives until April.

COMMENTS

The port suggests that Seaway debt be converted to equity; the costs of using the Seaway are too high. The port supports extended season navigation.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Board of Harbor Commissioners
Milwaulkee, Wisconsin

SHIP SIZE CAPABILITY

The port can handle 1000 foot ships and 730 x 76 foot ships; harbor depth 27 feet.

LOADING FACILITIES

There are 10 berths in the outer harbor, 3 berts in the inner harbor. The port is operating at about 40 to 55% capacity. There is a surplus of corn capacity with no current outlet.

FUTURE PLANS

The port is moving their container facility and getting additional Seaway depth for bulk loading. Two grain elevators are in use and there is a feasibility study to support a third elevator. The port is not in a good position for coal.

WINTER NAVIGATION

The port is relatively ice free in winter; local traffic continues all winter. No icebreaker is required. Navigation aids are not taken in.

SEASON EXTENSION

The present season is 15 April to 21 December. No changes are required for full season; they could go to full season now.

COMMENTS

The port supports a 10 month navigation season with possible increases later.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Superior Board of Harbor Commissioners
Superior, Wisconsin

SHIP SIZE CAPABILITY

The port can handle 1000 foot and 730 x 76 foot ships.

LOADING FACILITIES

The port has no problems servicing ships. They can handle 11,000 tons/hr of coal, taconite to 1000 ft vessels; 8-10 K tons/hr in five grain elevators.

FUTURE PLANS

The port expects an increase in grain trade and bulks. Grain would be shipped directly overseas and some would be transshipped. There is no export coal yet, but business may develop. The port plans to double capacity of energy terminal by 1985; they have 4 M tons capacity now, increasing to 7.5 to 8 M by 1985.

WINTER NAVIGATION

Full season navigation would require an icebreaker. They normally take up buoys in winter.

SEASON EXTENSION

The port normally closes 31 December but there is some late traffic to Thunder Bay.

COMMENTS

The port favors a 10 month season.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Toledo-Lucas County Port Authority
Toledo, Ohio

SHIP SIZE CAPABILITY

The port can handle 1000 foot ships and 730 x 76 foot ships; harbor depth 28 feet.

LOADING FACILITIES

The port has no problems with loading facilities. They have an extensive coal facility and rail lines for coal. They have lake coal shipping now. The general cargo business is dead.

FUTURE PLANS

They plan to increase coal business, could ship directly overseas or transship. They could cut waiting time that currently occurs at East Coast ports. One 1000 foot ship takes the place of 3 ships, therefore the smaller ships could be used for coal. They could do this even if East Coast coal facilities expanded. Rail loading capacity is in place. Grain facilities are available for overseas shipments and transshipping. There has been a $50 to $60 M investment in the past few years in grain port improvements.

WINTER NAVIGATION

Icebreaker assistance is required in winter, but icebreakers are currently available. Buoys are pulled in winter, therefore they would need special buoys.

SEASON EXTENSION

The port would favor full season navigation but 10 to 11 months would be adequate.

COMMENTS

Extended season navigation would be wonderful. Larger Seaway system would be a big help. They believe overseas traffic is turned away because of vessel size.

GREAT LAKES PORTS INTERVIEW REPORT

PORT

Port of Oswego Authority
Oswego, New York

SHIP SIZE CAPABILITY

The port can handle 730 x 76 foot ships with 24 foot draft with 19 to 22 foot draft at the grain elevator. There is a pier for 500 foot RO/RO ships.

LOADING FACILITIES

The coal piers are not active, but they can handle bulk, salt, and aluminum.

FUTURE PLANS

The port has no plans for expansion but in export bulk.

WINTER NAVIGATION

The port is open all winter.

COMMENTS

The port would like season extension to continue.

GREAT LAKES SHIPPING ASSOCIATION INTERVIEW REPORT

Dominion Marine Association
Ottawa, Canada

Dominion Marine presently has a study in progress that may answer some of the questions concerning fleet mix. This study will not be completed until the summer of 1981.

Currently grain shipments are being made in 660 foot ships with a smaller portion being taken in 730 foot ships, however the proportion on each type of ship in this trade is not known.

Many of the small ships in the Lakes trade are only operating in one Lake and are not using the locks at all; however, these ships are likely to be carrying only a small proportion of the cargo.

GREAT LAKES SHIPPING ASSOCIATION INTERVIEW REPORT

Lake Carrier's Association
Cleveland, Ohio

It is more economical to use larger ships and therefore they are used whenever port facilities are available. Larger ships are also used for transshipment. For example, a commodity may be offloaded at a port that can accommodate large ships and then is shipped up a shallow, narrow river in smaller ships.

Currently the demand for shipping on the Great Lakes is down, therefore the capacity of the shipyards is adequate.

Ship retirement is based on operating costs, not age. There is no fixed age to retire a ship.

The Association would like to see the navigation season extended until 31 January. Ice strengthened ships are available for winter navigation now.

The problem with the system channels is in maintaining project draft. There is not much of a problem with turns since most large ships have bow thrusters and stern thrusters.

There is a requirement for a new Poe sized lock at the Soo.

Saltie traffic is gradually falling off, mostly because there has been less in imported steel. Most Seaway people would like to see less imported steel and a corresponding increase of business on the Lakes.

The Soo Locks System does not have a charge bu the Welland and T. Lawrence Systems do. The Canadian Government is currently suggesting that user charges be imposed so that the cost of an improved system would be paid for by the users. If this policy is followed, traffic may be reduced by high tolls and user charges and the system may not be competitive.

Small ships operate in two Lakes but to not go through a locks system. As an example, sand ships come from Lake Erie and go to Detroit and ports on Lake Huron.

Lake Carrier's Association (Continued)

Large ships are often used in preference to small ships. For example, when the steel business is bad, large ships are used and the small ships are idle.

The Association believes that there may be a short term expansion of coal shipments because of the problem of capacity on the East Coast. They beleive that there msut be a $10 per ton demurrage charge before the Great Lakes shipment would be competitive. The problem with shipping coal from the Great Lakes to overseas is double handling and tolls. Shipping coal from the Great Lakes does have some advantages, however. Most ports in Europe are small, therefore shipping coal all the way in 730 foot class ships may be economical. The 730 foot class ships could also be used in the Lakes for transshipment to Eruope in larger ships. Also, coal may be shipped to Europe in large ships from East Coast ports then transshipped on arrival to the smaller European ports. These alternatives should be costed out to determine if Lakes shipping will be competitive for the coal business.

Dredging is important to maintain project depths in channels. It is necessary to cut off the high spots. Sometimes channels are not maintained at project depths. The Association does not expect deeper channels in the St. Marys River.

GREAT LAKES SHIPPING ASSOCIATION INTERVIEW REPORT

Shipping Federation
Association of Ocean Shippers
Montreal, Canada

The Federation cites problems with waiting at the Welland Canal. They report that in some cases the wait is 5 to 10 days. To help minimize these delays, the Shipping Federation provides an information service by radio to its members to help them get through the Canal. The situation is particularly bad late in the season. Some members estimate that 60% of the traffic goes thorugh the Canal between late October and early December because firms are stockpiling commodities for the winter. At these times there are typically 15 to 20 ships wating at the locks. Adverse wind and weather conditions also contribute to delays at these times.

To improve the efficiency at the Canal, the Federation would like to see special treatment given to larger ships. The capacity of the Canal is low because small ships go through cheaply yet the real cost of a lockage is nearly constant. To improve the system the Federation suggests first a new Canal. If this alternative is not possible, they suggest that all the locks in the present system be twinned. The size of the present system is satisfactory but it would be helpful to have an increase in draft. Ocean ships are presently coming through the system about 8 feet light.

END